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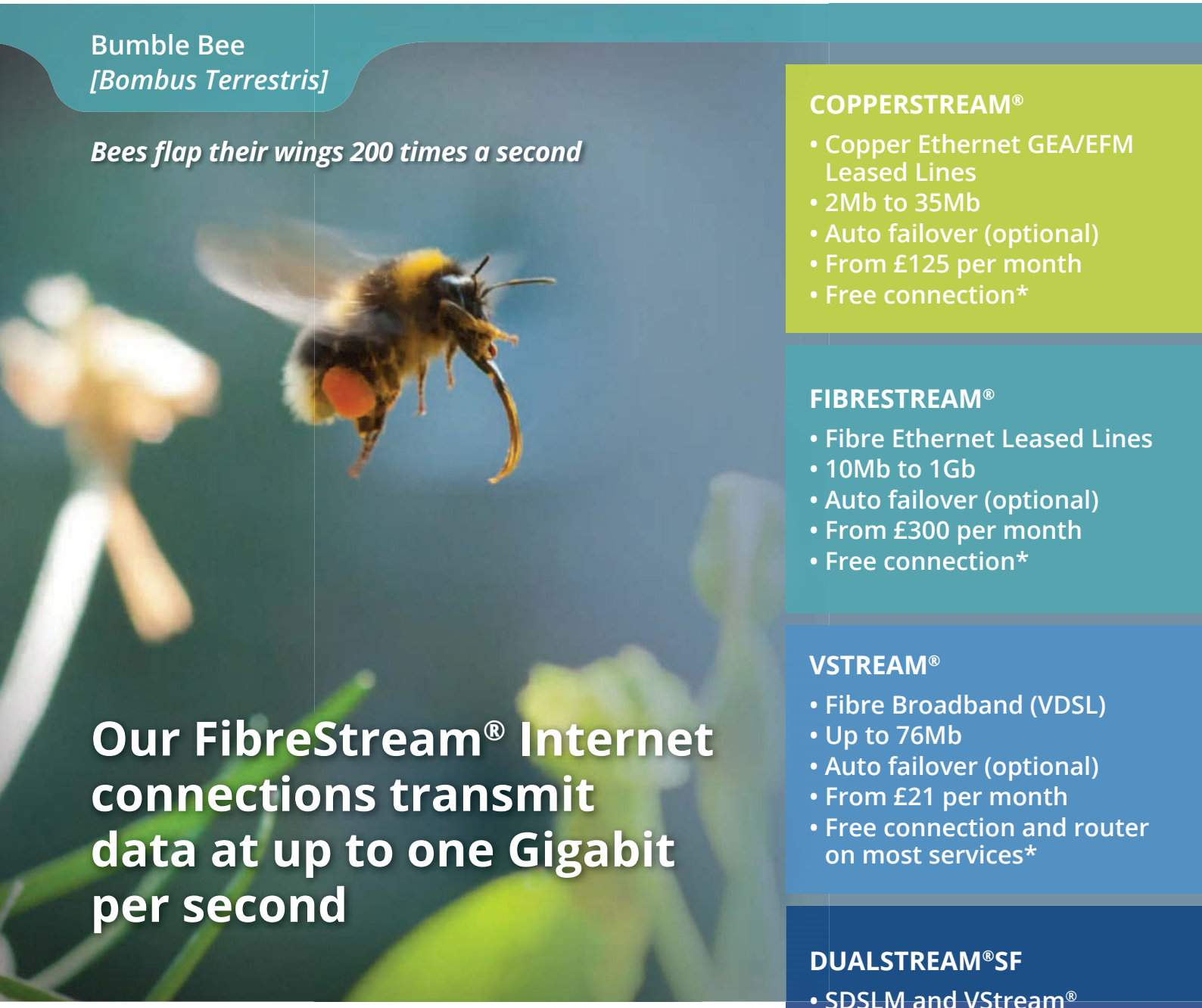
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Generation 6

Intel's new chips are here and they're the best yet

Skylake. It sounds like the title of a recent James Bond movie, but is in fact the codename for Intel's sixth generation of Core processors. It's hardly news, of course, but the chips are finally on sale, so you can build your own Skylake machine or – better still – buy a pre-overclocked PC with a warranty.

Time was when you'd save money by building a system yourself, but those days are long gone. Not only will you pay more overall because of your lack of buying power – PC builders buy in bulk so pay less – but you'll end up having to buy from multiple suppliers and potentially face the hassle of dealing with warranty claims or returns with more than one retailer. And you'll have to pay for a copy of Windows.

This month we asked six UK system builders to put together their best Skylake PC, and you'll find our reviews on page 68. They all use the new Core i5-6600K CPU. The 'K' suffix signifies that the chip is unlocked and overclockable, and all six companies took full advantage pushing frequencies as high as 4.5GHz. To learn how to overclock a CPU yourself, turn to our guide on page 110.

Numbers aren't the whole story, of course, and the Skylake processors offer more than simply great performance. They also use less power, which is why they're also a great reason to buy a new laptop. Dell's new Inspiron 15-5558 is a brilliant example (page 27), but Schenker hasn't limited itself to the mobile chip. Instead, it opts for a desktop CPU, meaning you get exactly the same i5-6600K as the desktop PCs in our group test.

There are lots of other Skylake processors, of course, and as the full range isn't yet available to buy, we've explained everything you need to know in our complete guide on page 80.

We've also been busy this month testing out the latest smartphones including the iPhone 6s Plus, Sony Xperia Z5, Huawei Mate S and Motorola Moto X Style. But if you're on a much tighter budget you can get a surprisingly good Chinese phone for under £100 (page 46 and 48).

Adobe's Flash plugin has been in the news a fair bit over the summer, but never for the right reasons. As well as security vulnerabilities, it can also make your web browser run slowly, so now's a good a time as any to banish it for good. We explain how on page 92. And if you're wondering which browser is best these days with the introduction of Microsoft Edge, we've put the main contenders through their paces on page 86.

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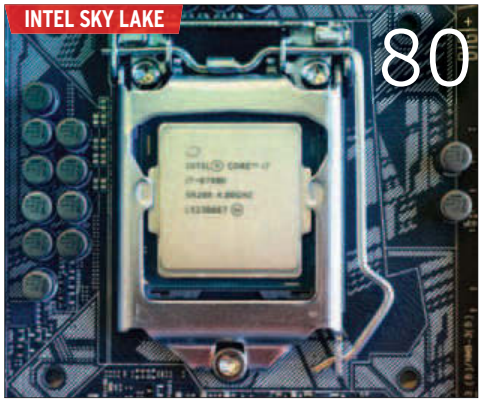


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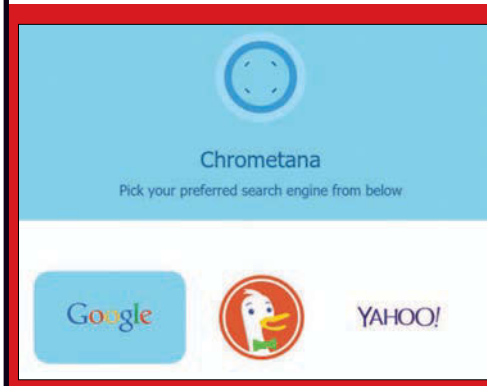


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TalkTalk's website hacked

UK teenager arrested in connection with massive data breach

UK police have arrested a 15-year-old boy in Northern Ireland in connection with the data breach at TalkTalk, as the broadband and phone provider faces growing criticism over its handling of the incident. The teenager, detained in Country Antrim, could face charges under the Computer Misuse Act, the Metropolitan Police said.

TalkTalk's website was breached on 21 October, resulting in the loss of customer names, addresses, birth dates, email addresses, phone numbers, account information, payment card and bank account details. CEO Dido Harding said she was personally contacted by someone claiming to be the hacker who demanded money, according to *The Guardian*.

The latest data breach is the third suffered by TalkTalk this year. In February, the company said scammers had approached some customers, quoting their TalkTalk account numbers and phone numbers. In August, the BBC reported that TalkTalk's mobile sales site was hit.

But the latest data breach could be the worst. Some of the data obtained was not encrypted, TalkTalk said in a FAQ. The payment card details, however, may be harder for criminals to monetise since some numbers were obscured.



Harding contended that cybercriminals would not be able to use information such as bank sort codes and account numbers that were exposed for fraud. Her assessment is accurate. But cybercriminals often assemble that kind of information into broader dossiers on people for identity theft-related schemes.

TalkTalk maintains it has not violated the UK's Data Protection Act, which is a set of principles dictating how companies are allowed to use data. The act mandates that firms are required to protect data to prevent disclosure but does not make specific prescriptions of what technology to use.

Encryption is recommended for sensitive data such as customer information. Even if data is obtained by hackers, it would be difficult or impossible to read without the decryption key, which should be guarded.

The Information Commissioner's Office, the UK's data protection watchdog, said it was aware of the latest incident and is working with the police.

Shortly after TalkTalk's breach, a message was posted on Pastebin purporting to be from the hackers. A sample of data was posted, although the post has now been removed by Pastebin.

HOW TO STAY SAFE

TalkTalk has said that customers should monitor their accounts over the next few months, meaning their bank account that funds their TalkTalk account. Watch out for even small transactions as criminals can often try to transfer a few pounds to see if it's possible, and also because they can go unnoticed.

If you do see any unusual activity, contact your bank and also Action Fraud UK (0300 123 2040).

Change your password

If you're a TalkTalk customer, you should also log into your account and change your password. This will stop anyone who has your login details from continuing to access your TalkTalk account.

This type of attack highlights why it's so important to use different passwords for all your accounts. If hackers get hold of your email address and password, they can try using those to access Gmail, Facebook, plus other banks and services.

Watch out for scams

Now that the hack is public knowledge, other criminals who don't have the stolen data will look to capitalise on it by trying to extract personal information from TalkTalk customers. They'll do this by emailing or phoning and pretending to be from TalkTalk. They might ask for your bank details, login details or any other personal information. As the company's website clarifies, it will never ask for bank details over the phone unless you have already given permission for them to do so.

If anyone calls and asks for information, it's best to ring them back from a different phone and use a number you know is genuine, not one they've given you.

In emails that claim to be from TalkTalk, be wary of clicking on links as they can take you to fake websites that look genuine but are just a way to entice you to type in your login details, which are sent straight to the hackers. Instead, type in the address of the website in your browser. Any page that asks for sensitive information should start with https:// – if it doesn't, don't enter your details.

The sender address on an email can be easily faked. Such a deception might be obvious to more astute technologists, but would likely fool most people.

Cybercriminals are known to use stolen email databases for phishing or other illegal activity, crafting believable messages that can trick people into downloading malware or revealing more personal information. But it's also possible other scammers who don't have access to the email list could send out random scam emails in hope that some are actually TalkTalk customers.

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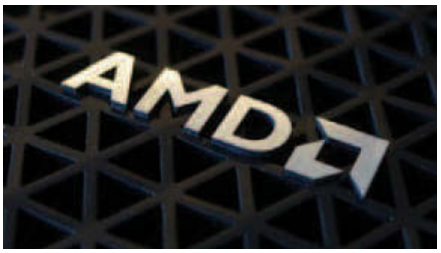


AMD suffers $197m loss at the hands of the PC market

Chipmaker blames lower CPU and GPU sales for falling revenue

Struggling amid a continued downturn in the PC industry, AMD has reported a wider loss than expected, though beating analysts' revenue expectations. The chipmaker reported a third quarter 2015 loss of $197 million on a revenue of $1.06 billion, blaming lower CPU and GPU sales for the red ink. A year ago, it reported a profit of $17m on sales of $1.43bn. Analysts surveyed by Thomson Reuters expected AMD to report a loss of 12 cents a share and revenue of $995.87m for the third quarter.

The company's woes were concentrated within its PC business, which suffered a $181m operating loss on a revenue of $424m. A year ago, that division had a revenue of $781m, though it reported a $17m loss. AMD blamed lower sales for the



drop, as well as an inventory write-down of older devices. While processor prices decreased, GPU prices increased, due to what it called "new GPU offerings" such as the Radeon R9 Fury series.

AMD has struggled recently, losing the man behind the upcoming 'Zen' chip, Jim Keller, while Phil Rogers, who led the company's heterogenous computing strategy, has moved to rival nVidia, heading up a team in its server business.

Its enterprise and embedded segment reported an operating profit of $84m on sales of $637m, driven by seasonally higher sales of AMD's semi-custom SoCs, which are found in all three major game consoles.

AMD has $755m of cash on hand, part of $3.2bn in assets. Plus, it will receive another $320m after striking a deal with Nantong Fujitsu Microelectronics to combine AMD's automated manufacturing and test facilities in China with NFME to develop a combined facility. NFME will own 85 percent of the joint operation.

The chipmaker said it believes revenue would fall by 10 percent during the fourth quarter, plus or minus 3 percent.

Why Intel continues to make money while PC sales nosedive

Intel insulates itself from falling chip sales by developing another business that's proving a success

We normally think of Intel as the engine of the PC. But as it proved recently, the company can keep increasing revenue even as the PC market declines, plus if it does recover, its business is poised to take off.

Intel's consumer processor division, the Client Computing Group (CCG), still makes up close to 60 percent of its business – $8.51 billion in total third-quarter revenue, compared to $4.1bn for its Data Center Group (DCG). But while the CCG's profits fell by 20 percent that quarter, Intel still recorded flat revenue because profits at DCG, which include SSDs and Xeon chips, were up 9.3 percent.

IDC recently reported that PC shipments plunged 10.8 percent during the third quarter – heading into "terra incognito" or unknown territory, according to Crawford del Prete, its chief research officer. PC shipments in the third quarter fell 7.7 percent year over year to 73.7 million units, according to Gartner.

Intel, however, has been able to hold steady because of its healthy DCG numbers. "In a time period where PC units are down in high single digits... we still get enough growth from the data center and the memory business and the Internet of Company Things to pretty much tread water in terms of revenue growth," Stacy Smith, Intel's chief financial officer, said during a recent conference call.

Here's the money quote: "If PC units are down in the mid-single digits, we actually grow at a pretty fast pace," Smith said. "And if we get to where PC units are flat, we're growing at a very fast pace."

Intel, according to Smith, is "much less dependent on the PC segment than we historically have been". Instead, the company's growth comes from the datacentre, and Intel continues to invest in memory and the Internet of Things as an additional growth driver.



Intel's strength, of course, comes partly at the expense of rival AMD (see above). It has insulated itself from a declining PC business via a robust enterprise product portfolio. (The company's conservative forecast for that datacentre business slightly worried Wall Street, though, as its stock fell by less than 5 percent after the news.) AMD, on the other hand, has been unable to free itself from the PC market, and is being dragged down as a result.

Storage giants are getting bigger, but prices will stay small

Why WD's acquisition of SanDisk won't impede the competition

Hard-drive giant Western Digital's planned acquisition of SanDisk is just the latest of several deals that could reduce the number of companies producing storage devices. Will this trend eliminate choice and let manufacturers raise prices?

No according to analyst Jim Handy of Objective Analysis. Buying hard drives and flash won't get more difficult or more expensive, precisely because selling them will remain a cut-throat business for the foreseeable future, he said.

The proposed $19bn buyout, expected to close in the third quarter of next year, came less than two weeks after another big storage-related deal in which Dell announced plans to buy EMC for $67bn. Plus, storage silicon maker PMC-Sierra is currently weighing multiple offers. And Western Digital has already helped to drive consolidation by buying Hitachi GST in 2011.

But Western Digital isn't buying SanDisk to become a bigger, more efficient maker of HDDs (hard disk drives). Instead, it wants SanDisk's core flash storage business to complement its own spinning disks. The three big suppliers of hard drives – Western, Seagate and Toshiba – will still be standing if the deal goes through.

Despite fast-growing demand for solid-state storage for some applications, hard disks aren't going away. Far from it, as cloud service providers such as Amazon and Google try to keep up with the exploding amounts of data their customers need. HDDs offer the best mix of speed and cost for storing much of that information. While SSDs are replacing some enterprise HDDs, high-capacity hard drives in PCs and online storage are not threatened by flash.

And the disk and flash businesses are going to keep punishing sellers while rewarding buyers, according to Handy. That's because both are largely commodity products that require huge investments in manufacturing capacity.

Once vendors have poured all that money into tooling for a particular product, they each have an interest in getting as many units as possible out of those investments. And despite overall demand for storage growing more than 40 percent per year,



manufacturers are building out the capacity to feed that demand well in advance.

That leaves just one way for each to move the maximum number of HDDs or SSDs: steal market share from rivals. Each cuts or keep prices lower to win those sales, and buyers win, Handy said. In other words, competition still works.

Dell's acquisition of EMC will give storage makers one fewer big customer they can win over, but that won't reshape the business, either. "There's still a very broad field of people buying hard drives," Handy said. That includes PC makers, server vendors, telecom equipment manufacturers, and companies like Facebook that build their own systems.

YouTube subscription lets you download ad-free videos

Google has announced YouTube Red, a service that will allow you to access content ad-free and offline

YouTube Red is a (for now) US-only subscription service that removes the ads from YouTube videos and allows you to download them for offline viewing. A single subscription can be accessed on any device signed into your Google account, which means you can enjoy the benefits on a PC, laptop, phone or tablet, and using the upcoming YouTube Gaming, YouTube Music and YouTube Kids apps.

YouTube Music is also said to be coming soon to YouTube Red, designed to "make discovering, watching and listening to music easier than ever". With its wealth of music videos, it could have the largest music catalogue of all streaming services.

The difference between YouTube Red and YouTube Music Key

YouTube Red is in essence YouTube Music Key out of beta. Music Key, like YouTube Red, offers the ability to download ad-free videos and play them back as audio.

Availability

YouTube Red is available now in the US, and visitors are offered a free one-month trial of the service. YouTube Music is merely said to be 'coming soon'.

UK launch

UK availability has not yet been announced, but provided that the launch is successful in the US we would expect it to hit the UK sometime in early 2016.

Price

In the US, YouTube Red costs $9.99 per month following the one-month free trial. UK pricing and availability has not been confirmed, but when it does come here we expect it to cost £9.99 per month in order to compete against other on-demand music-streaming services.

iPad and iPhone users will have to pay $12.99 per month for YouTube Red if they sign up via the app. This is because Apple takes a 30 percent cut of all app revenue. These users should sign up via a desktop browser to get the cheaper subscription, then sign into the app on their iOS device.

YouTube for free

The original ad-supported YouTube service isn't going anywhere; YouTube Red is an additional service for those who wish to legally download content without ads.

Does Google Music All Access include YouTube Red?

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Why it's time for BlackBerry to kill the BlackBerry



BlackBerry CEO John Chen keeps saying he may kill the smartphone pioneer; it's time to do it

Once again, BlackBerry CEO John Chen, the man brought into save the long-foundering mobile company, has said he's willing to kill its smartphone business. He's been saying that publicly for nearly a year now, effectively letting customers know to go elsewhere.

Maybe the idea was to get customers to show their commitment to BlackBerry devices; if so that strategy has backfired. Sales continue to decline to trivial numbers (now fewer than 3.5 million a year, or what Apple sells in five days), despite a series of new models of every conceivable design in the last two years.

Maybe the idea was to get customers to show their commitment to BlackBerry devices; if so that strategy has backfired. Sales continue to decline to trivial numbers

The newest model – whose details have been steadily leaked since February in BlackBerry's classic strategy of announcing products way before they are ready in an apparent attempt to keep customers enticed – won't help BlackBerry sales, either.

Chen's painfully awkward demo of that new device, called the BlackBerry Priv, also won't help. If he believed in it, he would have learned to be comfortable using it before doing a public demo of it. He did not.

The Priv is an Android smartphone that's due to be released sometime this autumn. It has unspecified extra security features in addition to a traditional BlackBerry physical keyboard that slides out. But Chen himself has described those capabilities as equivalent to what Samsung offers in its Knox-enabled Android devices. In other words, it's much less secure than a traditional BlackBerry and a little less secure than an iPhone. If an enterprise thinks an iPhone or Samsung Galaxy S is not secure enough, it won't think a Priv is either.

The buzz around the device, to the extent there is any, is over its physical slider keyboard, not its security. There's a vocal group of users who want such a keyboard, but Android makers abandoned the format several years ago (due to lack of sales). I doubt that group will buy the Priv, just as they haven't bought previous keyboard-equipped Android devices.

Even if they do, so what? If the market for such devices were reasonably large, handset makers such as Samsung, HTC, Motorola and LG would already be there.

Plus, there's the larger issue: if a CEO doesn't believe in his company's products, why should anyone else? Chen has made it clear multiple times he sees no future in BlackBerry devices. As sales dwindle, it's time for him to commit to his often-stated software strategy and kill its handset. (BlackBerry keeps buying other companies to deliver on that strategy.) I suspect he hadn't killed them sooner because they provided some cash flow as the firm made the transition he clearly does believe in: becoming a defence contractor for secured communications systems and software.

Some government agencies and defence contractors need the strong security that the combination of the BlackBerry device and network operations centre provide. There's a reason that the US' Secret Service won't let President Barack Obama use his iPhone.

When BlackBerry kills its handset business, that should mean as a consumer or regular business product. The BlackBerry should become a high-priced speciality device sold via government and defence contracts. These devices should be part of a secure messaging platform defence business, costing a few thousand pounds per device to give BlackBerry the income it needs to protect prime ministers, chancellors, presidents and cabinet ministers.

The BlackBerry should otherwise disappear. It's a distraction that's unloved even by its own CEO. ☒

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Internet Explorer users forced to upgrade

Microsoft's browser upgrade decree is proving disastrous for IE, reports Gregg Keizer

Microsoft's decision more than a year ago to require most Internet Explorer (IE) users to upgrade to the newest version appears to have had a disastrous impact on the browser's share, recently published data shows.

In August 2014, Microsoft told most IE users that they had to be running IE11 by 12 January 2016. After that date, the firm will support IE9 only on the little-used Windows Vista and Server 2008; IE10 on Windows Server 2012; and IE11 on Windows 7, 8, 8.1, 10, Server 2008 R2 and Server 2012 R2. Also on the support list was the new Edge, exclusive to Windows 10. Customers who run a non-sanctioned IE version after this date won't receive security updates.

Projections based on the rate of decline in the up-for-retirement IE editions point to between 39- and 41 percent of those running a Microsoft browser in January being severed from security updates.

The mandate to upgrade older versions of the browser, in most cases to version 11, has coincided with a major decline in IE's overall user share. A measurement generated by Net Applications tallies unique visitors to its clients' websites, then reads browser agent strings to estimate the online user percentages running a specific browser family or the editions among such families.

According to the firm, 51.6 percent of online users ran IE in September, a six-tenths of a percentage point decline from the month prior. Notable about this number is that it's IE's lowest since its salad days when it beat Netscape into the dirt, and lower than the earlier trough of December 2011, when IE accounted for 51.9 percent of all browsers.

Starting in January 2012, Microsoft's IE clawed back from the brink of minority status with a remarkable and steady three-year share climb that lasted until December 2014, when it peaked at 59.1 percent.

Since then, IE has lost 7.5 percentage points, an amazing amount in the slowly changing browser market, when movements measured in fractions of a percentage point are considered victories. IE has not suffered a nine-month decline of that magnitude since April 2010, when Mozilla's Firefox was charging toward a 25 percent user share mark and Google's Chrome was barely off the ground.



During September, 49 percent of all instances of a Microsoft browser were IE11, according to Net Applications. Substantial factions of the user base, however, continued to run versions slated for shutoff, notably IE8, which accounted for 22.7 percent of all browsers built by Microsoft. But IE9 (12 percent) and IE10 (9 percent) were also used by substantial portions of the Microsoft browser world.

Although other factors may have contributed to the decline in IE's user share, the simplest explanation is the upgrade directive. By demanding that users switch from, say, IE 8 to 11, Microsoft opened the door to alternatives. If users knew they had to change browsers, they seem to have been much more likely to select a non-IE browser, like Chrome, than if Microsoft had let sleeping dogs lie and not forced an upgrade.

Chrome has been the biggest beneficiary of Microsoft's must-upgrade-IE rule. In the 13 months since Microsoft mandated IE upgrades, Google's browser has gained a whopping 10.3 percentage points, ending September with a user share of 29.9 percent, its highest ever. Unless Chrome's advance unexpectedly stalls, it will have passed the 30 percent mark by the time you read this.

Most of Chrome's gains came from IE, but a bit more than a third originated from Firefox, which lost 3.8 percentage points in the same 13-month span. In September, Firefox's user share stood at 11.5 percent, the lowest since August 2006. In other words, Microsoft handed a golden opportunity to Google by requiring IE users to upgrade.

The debut of Edge, a browser that runs only on Windows 10, has not helped. (Net Applications lumps in Edge with IE editions to come up with the Internet Explorer total, which was 51.6 percent in September.)

Although Edge accounted for 2.4 percent of all browser user share in September, up slightly from 2 percent in August, its growth appears to have come at the expense of IE11, not Chrome or Firefox. IE11 fell by 1.6 percentage points: part of that decline was probably due to those who upgraded from Windows 7 or 8.1 – both which used IE11 as their default Microsoft browser – to Windows 10, and then switched to Edge.

Another part of IE11's slide was likely due to deserters to Chrome, with some of those users eschewing Edge for Google's browser when they switched to Windows 10. That was evident in another statistic: in September, Edge was run by 36 percent of Windows 10 users, down from August's 39 percent.

Browser share is not just about bragging rights; it has a financial impact. Each browser maker tries to steer its users to a different search provider, where customers, and thus the user share, can be monetised through search result advertisements. IE and Edge, of course, default to Microsoft's own Bing search engine; Chrome to Google; and Firefox, at least in North America, to Yahoo.

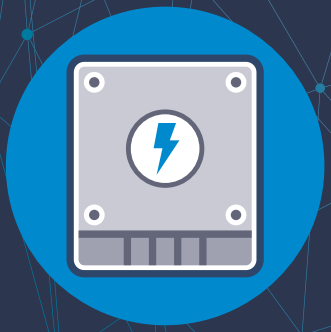
A shrinking share of IE could translate into fewer searches on Bing, with a concurrent decline in ad revenue. ☒

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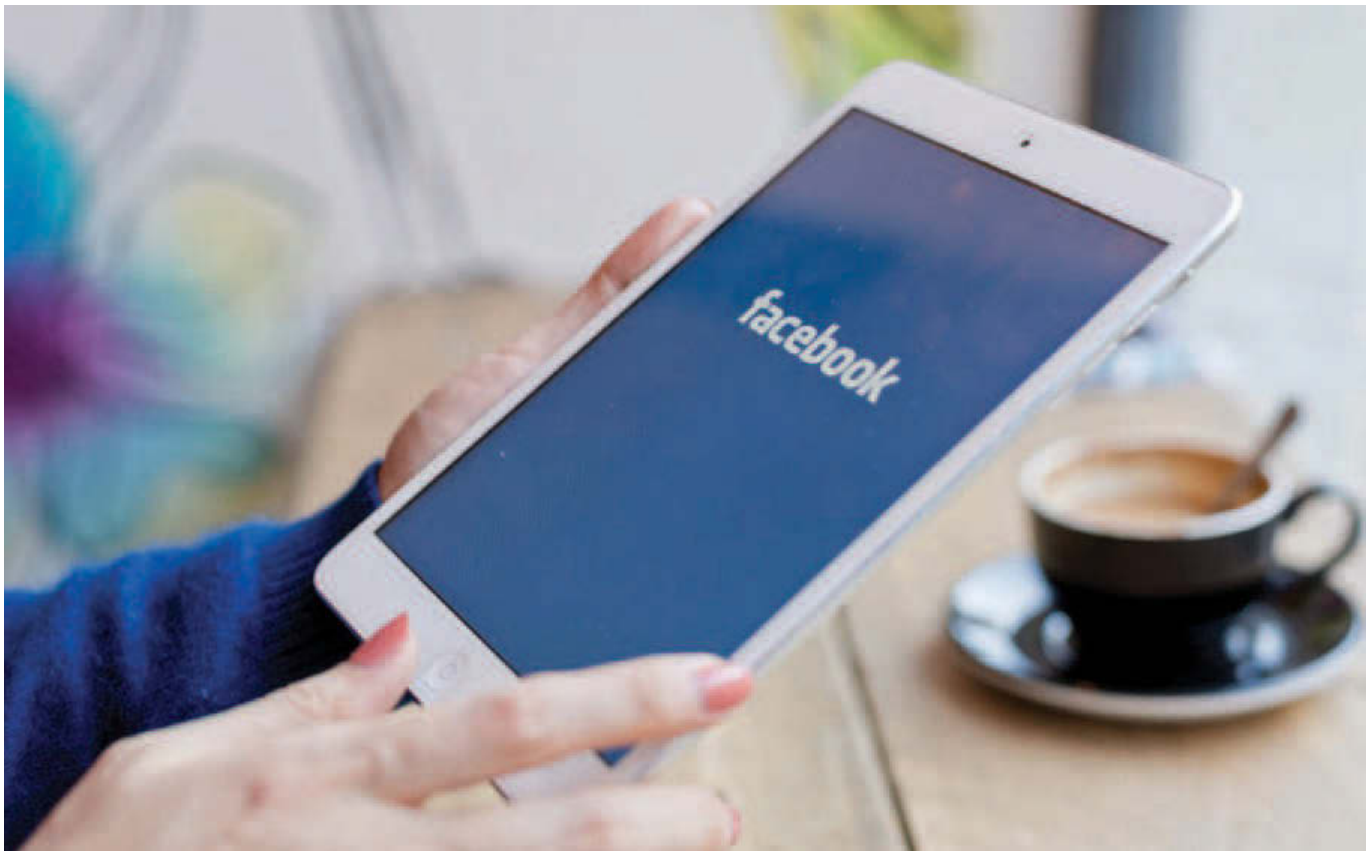
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Facebook won't get a dislike button

Facebook (finally) goes beyond the 'Like' with new 'Reactions', reports Matt Kapko

Facebook is set to roll out a new way for users to interact, beyond comments and the simple 'Like' button. However, its new 'Reactions' emojis (pictured) aren't the 'Dislike' option many users want, and they attempt to solve a problem that may not have a solution.

The question drives a significant share of activity on Facebook every day. More specifically, the company processed 6 billion Likes per day at the end 2014, according to Jason Taylor, Facebook's vice president of infrastructure.

Facebook's seemingly all-inclusive, and now globally recognised, thumbs-up Like symbol represents one of only two ways you can interact with posts in your News Feeds. The company has been especially restrictive on this point – limiting engagement to Likes and comments – and a 'Dislike' option has been the most requested feature from users for years, according to CEO Mark Zuckerberg.

The company is apparently now willing to give the people what they want with its new Reactions, a set of six emojis (in addition to the Like button). By hovering over or long-pressing the Like button, you will be able to choose from a series of animated Reactions including Love, Haha, Yay, Wow, Sad and Angry. Reactions are currently available only to Facebook users in Ireland and Spain, but the feature is expected to roll out globally later this year.

Chris Cox, Facebook's chief product officer, says the company "studied which comments and reactions are most commonly and universally expressed across Facebook" before designing the new feature. The social network has been experimenting with new ways for users to interact with posts for a long time, but the idea of a 'dislike' button was never really a serious option, according to recent comments from company leaders.

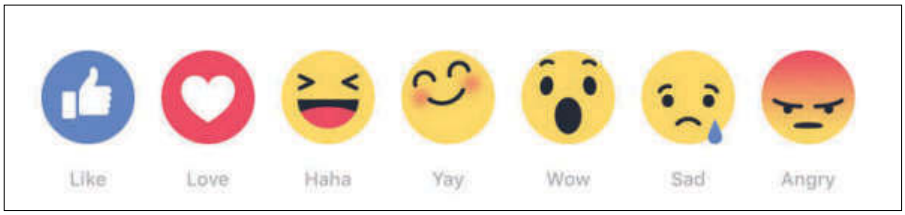
A Facebook problem without an easy solution

With Reactions, Facebook is trying to resolve a problem that may not have a simple solution. Surely there are better ways to show empathy than tapping an animated emoji, but that responsibility falls on the people who use the service, not Facebook.

"People aren't looking for an ability to down-vote other people's posts. What they really want is to be able to express empathy," Zuckerberg said during a public question and answer session in September. "If you are sharing something that is sad, whether it's something in current events like the refugee crisis that touches you, or if a family member passed away, then it might not feel comfortable to Like that post."

You can already drop emojis and stickers into comments. However, a Like can never convey the entire spectrum of human emotion, and neither can emojis.

Basic emoji functionality has long been available on other social networks and sites, and Facebook appears to have delayed Reactions as long as it could. You still won't get everything you want with Reactions.



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iOS still does app privacy better than Android

Android Marshmallow finally lets you control app access to personal data and services, but not as easily as iOS does. By Galen Gruman



There's not a lot new in Android 6.0 Marshmallow, which is now slowly making its way on to Android smartphones and tablets. Google characterises it more as an under-the-hood effort to improve system performance and stability. But one of the key new features for users is the ability to manage the privacy settings of applications.

How do Marshmallow's privacy controls compare to iOS's?

For several versions, Android has shown users what data and services an app wants to use when it is installed, but you could only accept or reject them all. Also, you weren't able to deactivate permissions (such as to your contacts or camera) later.

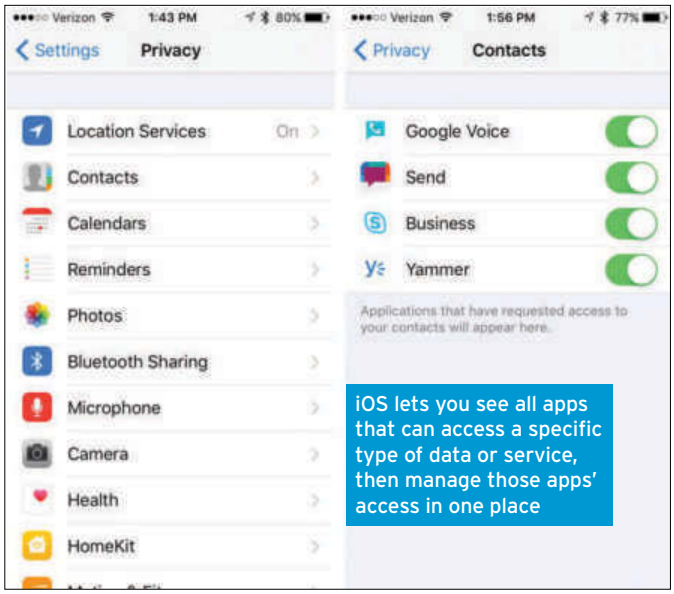
By contrast, iOS has for several versions let you manage specifically what data and services each app can use after you install it. iOS 9 continues to work the same way.

Although Android's new controls for managing specific privacy permissions is welcome, it's inferior to what iOS provides. The reason: iOS easily shows you all the apps that use a specific type of data or service, then lets you manage the access to that resource in one place. (In the Settings app, tap Privacy and the specific function to which you want to manage access, then use the switches to control each app's access to that function.)

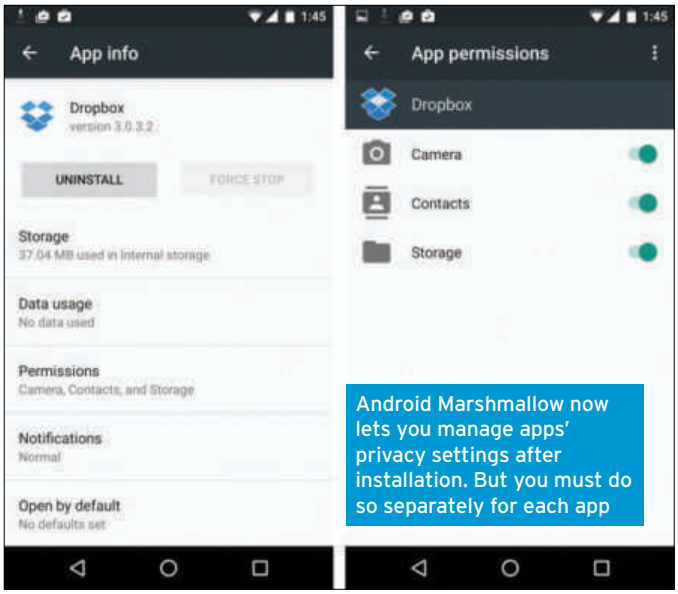
By contrast, Android Marshmallow hides that information, although it is available if you know the secret sauce. The operating system's UI steers you into checking each app's settings and managing the access settings separately. (In the Settings app, tap Apps, tap the app you want to manage, then tap the Permissions section. Use the switches to enable or disable access to specific features.) Thus, it's hard to get a clear picture of how exposed any type of data or service is across your smartphone or tablet.

If you want to see all the apps that use a specific type of data or resource, here's how. In the Settings app, tap App, then tap the Settings icon (the gear) to open the Configure Apps screen. Normally, you use the More menu (via the '...' icon) in Android for accessing additional features, but in this case you use Settings. In the Configure Apps screen, tap App Permissions to get a screen that shows each permission. Tap a permission, as you would in iOS's equivalent but more accessible screen, to see and manage which apps use those permissions. It shouldn't be that hard to find.

Of course, a diligent user will eventually find that obtuse path or go into each app's settings in Android Marshmallow and check into every permission. (iOS lets you work that way too; if you tap an app in Settings, you can see its privacy permissions and adjust them.) But Android's approach is also more apt to let apps get more access to your private data and system services than you'd like or realise.



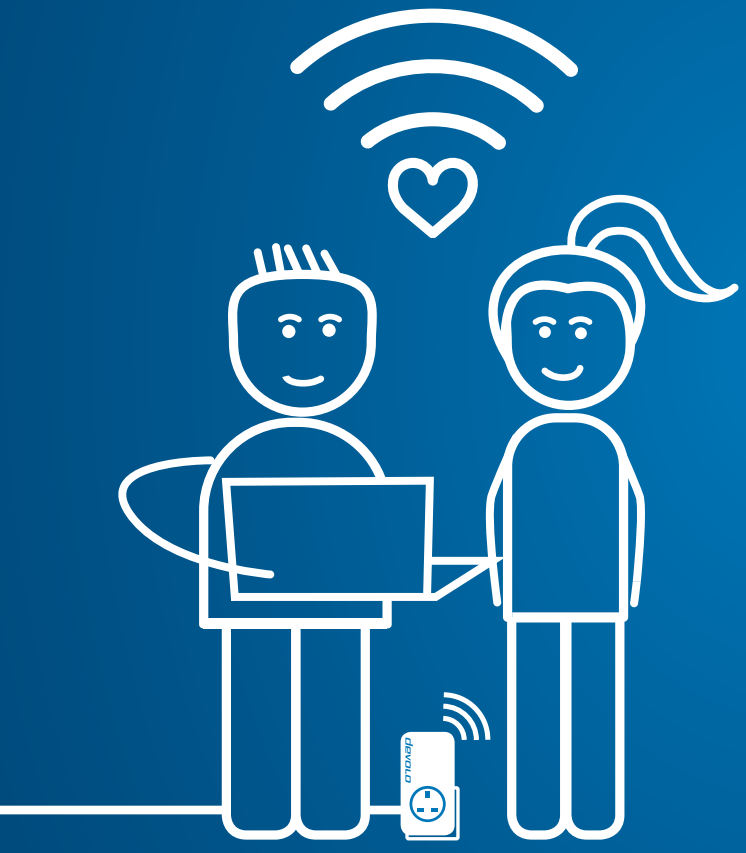
iOS lets you see all apps that can access a specific type of data or service, then manage those apps' access in one place



Android Marshmallow now lets you manage apps' privacy settings after installation. But you must do so separately for each app

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Infected Apple

Is Apple's walled garden showing signs of erosion, asks Matt Kapko

A rudimentary malware attack that infected hundreds of iOS apps before Apple caught on puts a spotlight on security and brings into question the market perception that the firm's platform and devices are inherently safer than rivals' products.

The tech giant has long benefitted from a perception that its devices and the software that powers them are more safe and secure than the competition. However, last year's high-profile iCloud hack and a recent large-scale malware attack have brought Apple security into question.

Apple recently suffered a potentially catastrophic security lapse when malicious code injected into a counterfeit version of Xcode, the company's app development toolset, made its way into hundreds (and perhaps thousands) of apps from Chinese developers. The malware affected hugely popular apps, including WeChat, which was eventually pulled from the App Store. Apple failed to detect and stop the malware from entering its 'walled garden' and gaining access to an untold number of customers' iOS devices.

Apple's stringent app review process was no match for the rudimentary malicious program, called XcodeGhost, that was embedded into the counterfeit Xcode tools used by mostly unsuspecting developers in China. Apple still hasn't disclosed the exact number of apps that were infected, but the company's senior vice president of marketing Phil Schiller told Chinese microblogging website Sina that it's not aware of any cases where malicious apps transmitted user data, according to CNBC's Twitter account.



Apple security: a question of perception versus reality

Prior to this recent attack, malicious apps had made their ways into the App Store only five times, according to cybersecurity firm Palo Alto Networks, which first reported the XcodeGhost attack on 17 September. The scope and potential damage that could come as a result of the recent breach are greater than previous malware attacks. The real damage, however, might be to Apple's brand and its perception of unparalleled security in the market. The company fell victim to its second major privacy scare in 12 months, and there's reason to believe that it will be subjected to more attacks at even greater frequency in the future. In other words, cracks are starting to appear in the walls that surround (and protect) Apple's ecosystem.

Bill Anderson, chief products officer at mobile malware security firm Optio Labs, is surprised that more instances of malware running on Apple devices haven't come to light, because there are no technical differences between iOS and other mobile platforms that would make it less vulnerable to attacks. "They're not doing anything radically different from anyone else in the industry. They may be doing it slightly better. They may have also just gotten luckier for a longer period of time," he says.

Anderson adds that the most worrisome thing about the Xcode exploit is how the relatively simple malware sailed through Apple's app review process undetected. "Why didn't the Apple tools trigger to this? If they didn't, what else are they not triggering to, and why not?"

XcodeGhost: the 'largest App Store breach in history'

Apple's customers take comfort in the preconceived notion that iOS devices aren't susceptible to malware, because the company checks every app carefully before they're approved for public availability via the App Store. Despite the latest high-profile security incident, the firm will maintain that perception, according to Anderson. "There could be additional Apple exploits over the coming year, and we could start getting annoyed by them, but I think [iOS] is going to hold onto that perception of being [more secure] than Android for the foreseeable future," he argues.

Thomas Reed, a Mac security expert and director of software maker Malwarebytes, calls the XcodeGhost attack "easily the largest App Store breach in history" and says that the incident "will erode consumer confidence in the App Store as a (mostly) unassailable malware-free fortress."

Apple's review process, paired with its goal of absolute control over the App Store, reinforces the perception that its devices are more secure. When that system fails, trusting users become victims, and over time confidence and blind faith will be called into question. "Perfectly respectable, legitimate apps turned out to be infected," Reed writes in a related blog post. "It's hard for any user to be on guard against this kind of malware. Especially on iOS, where security features in the system make anti-malware software impossible."

In many ways, the tech giant is a victim of its own success. "Apple's security strategy is so well-engineered that its biggest danger may be the false sense of security it gives developers and the massive number of iPhone users," says John Gunn, vice president of communications at Vasco Data Security.

Apple and devs to blame, but iOS users need to be vigilant

The specific long-term effects of the XcodeGhost malware attack are unknown, but because no serious or particularly

nefarious events occurred as a result, Anderson believes last year's iCloud-based attacks on more than 100 celebrities were more damaging. However, Apple wasn't hacked in that case; users' accounts, and the associated passwords, were compromised. "That was devastating for those people, but it wasn't a platform attack. It was just as effective as if it had been, but the platform itself wasn't really questioned."

Apple will shoulder much of the blame for failing to detect XcodeGhost, but the onus is also on developers who used infected versions of Xcode. These coders reportedly downloaded bad versions of the utility hosted on third-party sites, in an effort to avoid the latest version the software because it is so large (more than 4GB). However, they had to disable Gatekeeper, Apple's security software, to run the bootleg Xcode tools.

In the future, smart users should be more vigilant, but unfortunately Apple's control over its ecosystem means that customers have little recourse when breaches occur. "Users should be more worried, and unfortunately there's nothing they can do about it," Anderson says. "It's great if your big buddy Apple does everything for you, but if they screw it up there's no way to solve the problem yourself."

Twitter Moments

Twitter's 'Moments' miss the mark, says Matt Kapko

Twitter kicked off the final quarter of 2015 with a bang, naming a new (sort of) CEO and finally releasing its curated 'Moments' feature. However, early reviews of the service suggest the company may have aimed too low.

After a summer of uncertainty, Twitter made two of the most important announcements in its history. The first of these was that cofounder and former CEO Jack Dorsey was officially renamed Twitter CEO, following an exhaustive search that ultimately led back to where it started. He was fired from the company in 2008, but was later named interim CEO in July 2015, before taking the new job.

However, Twitter's announcement, which revealed a new feature called 'Moments' could prove to be more crucial to the company's future than its new leader. Unfortunately for Twitter, early reviews of Moments, which aims to curate and highlight a combination of real-time and older tweets, suggest users aren't exactly impressed.



Twitter cofounder and CEO, Jack Dorsey

Twitter tries curation again

Moments follows a series of previously failed attempts to make sense of the 500 million tweets people post to the platform each day. The feature offers a mix of tweets and short video clips, curated from Vine around specific topics and areas of interest. Moments won't likely interest many of the company's power users, but it could make the platform more appealing to beginners or more casual users.

Twitter moments

Moments is an attempt to deliver a snapshot of the 'best of Twitter', and that strategy "may hold more appeal for someone who is trying to figure out how to use the platform," argues Forrester analyst Erna Alfred-Liousas. "The content is light in some areas and may not necessarily live up to the items I'd choose for myself, but this is a step in the direction of innovation."

Twitter Moments lacks sense of urgency

Moments features five categories: today, news, sports, entertainment and fun. The afternoon of Moments' first day of public availability, editors hired by Twitter to curate and package the day's most important news and media delivered only 11 stories: seven in news, three in sport, and one in entertainment. Midway through the day following its release, Moments hadn't been updated with any new sports or entertainment stories.

Greg Meyers, Motorola CIO, who considers himself a religious Reddit user, isn't impressed with Moments. Meyers says the new feature represents what Twitter wants its users to see, but other social networks enable more personalised experiences. And a quick comparison of story feeds on CNN and in Twitter Moments showed nearly identical selections, according to Meyers. "I could see myself with 60 seconds to spare using [Moments] or CNN, but my nightly reading is still going to be Reddit and Feedly." However, Meyers says people who already use Twitter as a primary news source will probably appreciate the new breadth of information within the app.

Moments available only in official Twitter apps

Despite these early shortcomings, Moments may be the exact kind of thing Twitter needs to capture new users, and regain lost ones, according to Jan Dawson, chief analyst and founder of tech research firm, Jackdaw. "It's immersive, it's very easy to use and it takes no training at all to get going with it," he enthuses. "I think the categories capture a lot of the stuff people are most likely to use Twitter Moments for, but there's always scope for them to do more later."

However, many Twitter members (including Dawson) don't use the official Twitter app and won't generally see or use the Moments features, because it's not available in popular third-party apps. "This is one of the biggest challenges Twitter faces – many of its power users are using third-party apps where their newest functionality isn't available," Dawson adds. "That could drive those users back to Twitter's own apps, but it could also create a growing gulf between the experiences of Twitter's power users and its mainstream users."

Why Western Digital is buying SanDisk



Lucas Mearian reveals the thinking behind Western Digital's multi-billion dollar purchase

Western Digital (WD) has announced that it's buying fellow data storage vendor SanDisk in a cash and stock deal worth about $19 billion.

The move comes as the IT industry is evolving rapidly as companies look for ways to embrace trends such as wearables, the Internet of Things (IoT) and the cloud. The result has been a recent wave of mergers and acquisitions and investment activity in the data storage market.

WD's purchase of SanDisk comes on the heals of the data storage market's biggest-ever acquisition, Dell's purchase of EMC for $67 billion. In addition, storage semi-conductor maker PMC-Sierra has receive multiple takeover bids, while China's Tsinghua-owned Unisplendour has agreed to buy 15 percent of WD for $3.78 billion.

WD, a company steeped mostly in hard disk drive (HDD) technology, faces an evolution in IT that is driving companies to address a changing set of requirements for both client and enterprise end customers.

Changing needs

Companies no longer rely on tape drives for backups and hard drives for primary data, but must also deal with the higher speed requirements of applications such as online transaction processing.

Today, solid-state drives (SSDs) are a critical component of multi-tiered storage infrastructures where flash memory devices sits just under DRAM as top-tier storage.

In addition to enterprise products, both WD and SanDisk are California-based companies heavily involved in different segments of the consumer data storage market. WD offers desktop NAS drives, while SanDisk is a leading provider of flash-based thumb drives and memory expansion cards.

Earlier this year, SanDisk, also known for internal SSDs for desktops and laptops, announced its first line-up of pocket-sized, high-capacity external drives.

WD's buyout of SanDisk mainly gives the company an instant foothold in the global, non-volatile NAND flash memory market, according to Jeff Janukowicz, research vice president at IDC.

"Additionally, the NAND industry is at an infection point as it transitions from planar to 3D technology and access to that technology was a key piece of the deal," Janukowicz told us. "Now, WD is positioned to address a much larger footprint in the storage industry."

WD itself noted in its news announcement about the deal that the combination will "enable it to vertically integrate into NAND, securing long-term access to solid state technology at lower cost."

SanDisk, which has 27 years of experience in the NAND flash memory marketplace, recently announced a deal with leading flash maker Toshiba to manufacture the world's densest 3D NAND – a 48-layer, 32GB chip that offers twice the capacity of the next densest memory.

3D NAND represents the most advanced memory product to date, achieving far greater capacities at lower production costs by stacking layers of NAND flash cells atop one another like microscopic skyscrapers.

All major producers of flash products have announced their own versions of 3D NAND, some denser than others. Intel, for example, recently announced that it will convert its fabrication facility in Dalian, China from making processor chips to making 3D-NAND flash chips.

Intel also plans to invest up to $5.5 billion in its 3D NAND project. The Dalian fab plant is scheduled to begin producing memory chips in the second half of 2016.

In its acquisition announcement, WD singled out the 15-year partnership between SanDisk and Toshiba, stating that it expects that relationship to be "ongoing."

"The [joint venture] provides stable NAND supply at scale through a time-tested business model and extends across NVM technologies such as 3D NAND," WD said.

Overlapping portfolios

While the WD and SanDisk data storage product portfolios do overlap slightly in that both companies sell enterprise SAS-based and PCIe-based SSDs, in general the buyout will increase the addressable market and provide revenue diversification for WD across multiple technologies and market segments, Janukowicz said.

Gregory Wong, an analyst with Forward Insights, said the deal allows WD to enter the consumer SSD and enterprise SATA SSD market. "WD wants [SanDisk] for the access to the flash. Their PC HDD business is declining due to the weak PC market but also because SSDs are encroaching that space," he explained. "Without access to NAND flash at cost, it would've been difficult for them to participate in that space and also would've increasingly been difficult to compete with NAND players in the enterprise space."

The NAND flash market grew rapidly over the past decade, but in the past few years, it has consolidated and growth has slowed because it can't support the many players.

Because there's little product overlap, the WD-SanDisk merger doesn't really add much in the form of market consolidation, Wong said. "With this transaction, Western Digital will double its addressable market and expand its participation in higher-growth segments," Wong said.

Western Digital said that Steve Milligan will continue to serve as CEO of the combined company, which will remain headquartered in Irvine, California.

Windows 10 update

When will Microsoft release the first major update to Windows 10, asks Gregg Keizer

No-one really knows except the people at the company's headquarters in Redmond. Fortunately for outsiders, even the short stretch of Windows 10's life so far offers clues about Microsoft's process.



Background information

Microsoft has purposefully been vague in describing the intervals between releases to the 'Current Branch' (CB), one of four update-and-release tracks and the one all consumers and many small businesses will live on. That's no surprise: Under a 'service' rather than 'software' model – and Microsoft has been firm in the 'Windows as a service' description of 10 – timing is supposed to depend much more on the quality of a release than what it actually contains, and strictly speaking, should not be pinned to a hard-and-fast deadline. Again, the quality of the update should supersede the calendar.

But Microsoft has talked of Windows 10's update cadence, if only because the new scheme is a massive change from decades of prior custom, and it still needs to provide users, particularly those in enterprises, with some structure.

Until recently, Microsoft talked up a three-times-a-year update tempo, with new features and functionality, user interface (UI) and user experience (UX) changes, on the table every four months. Lately, though, Microsoft has become rather vague about that frequency. In a detailed explanation of Windows 10's servicing, Microsoft said it "expects to publish an average of two to three new feature upgrades per year."

Under the three-times-annual plan, Microsoft should ship the first update to the Current Branch around late November, four months after Windows 10's 29 July RTM.

Patch Tuesday

One clue suggests a date after 12 November, the month's Patch Tuesday release of Microsoft's security fixes. In both September and October, Microsoft packaged that month's Patch Tuesday security fixes within a new build for users on the Insider 'fast' track. Insider is the preview program that lets people install early versions of Windows 10. In Microsoft's lexicon, a 'ring' is a subset of an update track.

On multiple PCs running the Insider (beta) versions of Windows 10 and assigned to the fast ring, builds were received and installed but no visible downloads were done of the last two months' worth of the cumulative updates, which included the security patches received by customers running Windows 10 RTM.

In September, Windows 10 Insider did not receive the 8 September cumulative update, but was later upgraded to build 10547 on 18 September. Meanwhile, in October, Microsoft upgraded Insider to build 10565 on 12 October, a day before the 13 October cumulative update that RTM users got as the Windows 10 part of Patch Tuesday. Build 10565 has not received any updates other than the usual malware signatures for Windows Defender since, indicating that October's Patch Tuesday was tucked inside.

It's unclear why Microsoft is doing it this way – rather than delivering the month's Patch Tuesday contents as a separate cumulative update – but the important point is that it not only continues to do so, but also stuck to the practice in July, when it issued the RTM code as build 10240 to Insiders on 15 July, a day after that month's Patch Tuesday.

If it reuses that pattern, it won't offer an RTM-quality build of the first update until after 12 November.

Fast-.iso-slow

Another tidbit pulled from Microsoft's pattern so far also indicates that the first major update – which has been dubbed 'Threshold 2', with Microsoft using the abbreviation 'TH2' in its build labelling – is not imminent.

Last month, Microsoft shipped build 10565 to the fast ring (12 October), offered the same build as disk images in .iso format (15 October), and then delivered it to those on the Insider slow ring (16 October).

The last time it did a three-step release was over a several-day stretch in late May and early June, about two months before Windows 10 launched.

While the prior two-month gap between the events is unlikely to be repeated for Threshold 2 – it would mean the update wouldn't appear until mid-December – the fast ring-.iso release-slow ring cadence can be interpreted as a precursor to RTM, and not an immediate one.

Simultaneous fast and slow

In July, Microsoft released build 10240 – the RTM code – to all Insiders, those on both the fast and slow rings, on the same day, 15 July, as a final quality check, particularly of the release process, before tossing it into the deep end of the Windows mass market.

Again, the interval between that event and release – in July it was 14 days – means less than the fact that the simultaneous fast-slow rings update preceded the official launch. Microsoft has yet to identify a build and ship it to both the fast and slow rings on the same day, signalling that the latest build, 10565, is not the RTM candidate.

Splash date

Microsoft is in uncharted territory with Windows 10 on a whole host of levels, including how it introduces the several-times-a-year updates to Window 10. Does it do a splashy event? Does it just roll out the update sans fanfare?

In the end, it's all guesswork. With so few data points – Microsoft has never done this before, and the pattern established with the 29 July RTM may have been a one-off – deciphering clues like this has more than a whiff of speculation.

More new products online:
tinyurl.com/gadgetspca

Windows 10 SPECIAL

Microsoft Surface Pro 4

Convertible Tablet

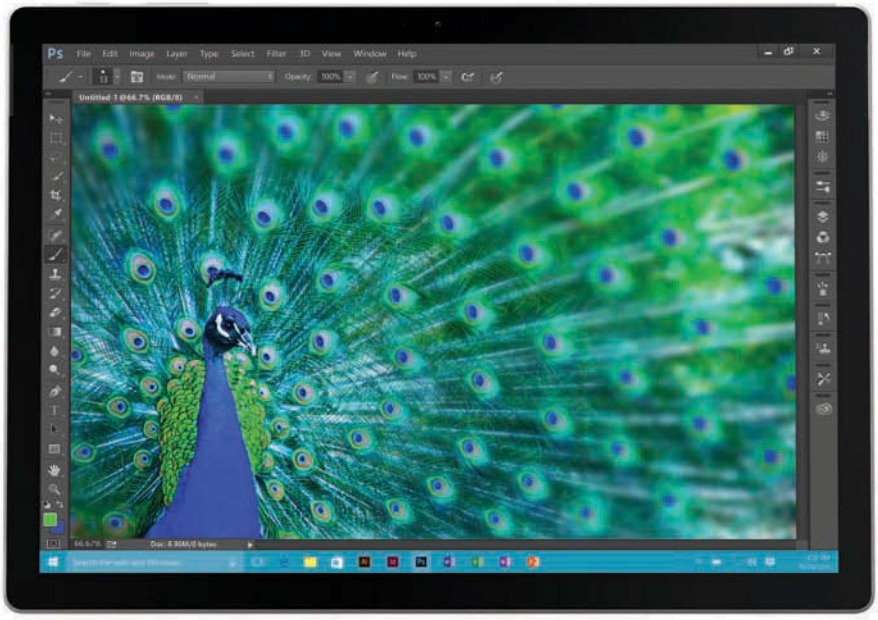
The latest Surface tablet is thinner and lighter than its predecessors, though Microsoft has kept the full-size USB port. The top-of-the-range model offers 16GB of RAM, 1TB of storage and a Core i7 Skylake processor. The Surface Pen has been improved too, with a magnetic attachment, 1,024 levels of pressure and interchangeable tips, while the Type Cover has a larger trackpad, 19mm key pitch and 1.3mm travel.

From £749 inc VAT
microsoft.com/en-gb





CHRIS MARTIN





Microsoft Surface Book

Convertible Laptop

According to Microsoft, the Surface Book is
", with a 13.5in screen,
re i7 Skylake chip and
keyboard. It detaches
'muscle wire' system.

From $1,499 (£TBC)
microsoft.com/en-gb





Lenovo Yoga 900

Convertible Laptop

Lenovo's Yoga 900 is another 360-degree hinge product, and offers various upgrades compared to the Yoga 3 Pro. Not only is the hinge colour-matched, but it has better cooling, USB Type-C, a sixth row of keys and a larger trackpad. It also has a larger 66Wh battery and an Intel Skylake processor.

From £1,199 in VAT
lenovo.com/uk



Asus Transformer Book T100HA

Convertible Tablet

If you're strapped for cash but are looking for a Windows 10 device, then this Asus is worth a look. With an Intel Atom processor, the tablet has a detachable keyboard, Type-C USB and is available in a range of colours. Asus claims 12 hours of battery life, and 90 minutes of power after a 15-minute charge using BoostMaster technology.

£299 inc VAT
asus.com/uk

HP Spectre x 2

Convertible Tablet

Microsoft's partners are quickly producing Surface rivals and you can see the similarity in the Spectre x2. It has two USB Type-C ports, a Full HD screen and offers up to 10 hours of battery life. It comes with an optional keyboard and pen, but uses a less powerful Intel Core M processor.

From $799 (£TBC)
hp.com/uk



Dell XPS 13 (2015) »

Laptop

Dell's line of XPS laptops has long been popular and the latest models look set to continue that tradition. The XPS 13 looks gorgeous, with its tiny bezels and carbon fibre desk. The refreshed line-up has an Intel Skylake processor up to Core i7, 1TB of storage and 16GB of RAM. It also features Thunderbolt 3 and has a 54Wh battery.

£849 inc VAT
dell.co.uk





« Acer Aspire Z3-700

All-in-one PC

This all-in-one PC with Windows 10 has a built-in battery that will last up to five hours. Weighing in at 2kg, it has two kickstands that allow it to lay flat or stand upright. There's a choice of Intel Celeron or Pentium processors, up to 8GB of RAM, plus an SSD, all housed behind a 17.3in Full HD screen.

From £399 inc VAT
acer.co.uk



Toshiba dynaPad »

Convertible Tablet

Toshiba's answer to the Surface is the oddly named dynaPad. It works in a different way to Microsoft's tablet in that it connects to the keyboard with magnets. It's thin and light, at 6.9mm and 569g, and has an Intel Atom processor and up to 4GB of RAM. It's been designed to replace pen and paper, so comes with a Wacom Active Electro-Static stylus that supports 2,048 levels of pressure.

From ¥130,000 (£TBC)
toshiba.co.uk

LAPTOP

Asus G751JT-T7171H

£1,559 inc VAT

Contact
■ asus.com/uk

Specifications
17.3in (1920x1080, 127ppi) IPS matt anti-glare; Windows 8.1; 2.3GHz Intel Core i7-4850HQ (3.5GHz Turbo) 4C, 8T; Nvidia GeForce GTX 970M with 3GB GDDR5 + Intel Iris Pro Graphics 5200; 24GB (3x 8GB) 1600MHz DDR3 RAM; 256GB PCIe 3.0 x4 SSD + 1TB 7200rpm SATA HDD; gigabit ethernet; 802.11ac, 2x2 MIMO; Bluetooth 4.0; BD-ROM/DVD±RW DL, tray-load; 4x USB 3.0; HDMI, VGA; Thunderbolt; SDXC card slot; stereo speakers with auxiliary bass; 0.9Mp webcam; dual mic array; UK tiled keyboard; two-button trackpad; 90Wh lithium-ion, non-removable battery; 230W mains charger with IEC C13 inlet; 416x318x39-82mm; 4.2kg

Build: ★★★★½
Features: ★★★★½
Performance: ★★★★½
Value: ★★★★☆

★★★★½



PC ADVISOR RECOMMENDED

There's been a turnabout in gaming laptops lately, and hulking great gaming stations are no longer de rigeur. If you need a notebook with games talent, you can now find near-ultraportable class machines weighing around 2kg and measuring 20mm thick that will game with smooth graphics. The Asus G751J is not that laptop, instead being an old-school desktop replacement. Only it sports more panache than any traditional gaming wedge.

The G751J serves as a platform for the nVidia GeForce GTX 970M, still one of the most powerful laptop GPUs on the market. This is backed by a quad-core Intel Core i7 processor, starting at 2.3GHz with Turbo to stretch to 3.5GHz. The Asus has 24GB of memory, and storage comprises one of the fastest SSDs available – a 256GB Samsung SM951 with PCIe attachment. For bulk games storage there's a 7200rpm 1TB hard disk.

The raw physical stats suggest a portable PC of some stature – nearly 4.2kg in weight, and a thickness of 82mm better listed as 'height'. Yet the sculpted chassis mixes soft lines and stealthy angles to create a beautifully fashioned machine of utility and style.

Lifting the huge 17.3in lid continues a black-with-red-highlight theme, and reveals the high-quality expansive screen. This IPS panel provides a superb window through which to experience modern games. A contrast ratio of 680:1 and good colour accuracy (Delta E average 1.4) are complemented by textbook wide viewability, and a decent, if not stellar, gamut of 91 percent sRGB. Its full-HD resolution is arguably ideal for gaming, ignoring the Ultra HD trend that is not ideal here.

The red-backlit keyboard is high-quality but a little clackety. Three macro buttons are included, along with Steam and screen-capture video buttons. The large trackpad moves the cursor smoothly but with overshoot that gives a drunken effect. Huge left- and right mechanical buttons have a deep action and add to the clunk effect. However, you're unlikely to ever play a game using a touchpad, so it's not a major problem.

This version of the G751 includes a Blu-ray reader and DVD writer, and besides the standard fare of HDMI, VGA, four USB 3.0 and SD card slot Asus has added a versatile high-end port: Thunderbolt. This also allows a third monitor to be connected.

By default nVidia's G-Sync is enabled, which smooths action and removes tearing effects, although it also limited maximum framerate to a silky 75fps. We disengaged to see what the 970M could achieve, and quickly saw its potential – 103fps in Cinebench 15 is a sterling result.

Gaming is the aim though, and Batman zipped through at 117fps at the screen's native resolution and High detail. Maxing out to Extreme still allowed 95fps. Similarly, Tomb Raider averaged 115fps at High detail, and with all effects on and Ultimate mode, it still ran at 60fps.

The challenge of Metro: Last Light was met with 90fps at High detail, and a nearly playable 28fps (Very High with all effects), although we did see some unexplained regular pauses through this benchmark.

You may not expect long runtime off the mains, but the sealed 90Wh battery allowed three hours nine minutes in the streaming video test.

Verdict

The G751 is a battleship in mobile gaming, in build quality, looks and firepower. It's a bargain in relative terms, a solid desktop replacement and a bruiser of a games station.

☒ **Andrew Harrison**

LAPTOP

Dell Inspiron 15-5558

£586 inc VAT

Contact
■ dell.co.uk

Specifications
15.6in (1920x1080, 141ppi) matt antiglare display; Windows 10 Pro; 2.2GHz Intel Core i5-5200U (2.7GHz Turbo) dual-core with HyperThreading; nVidia GeForce 920M with 4GB DDR3 + Intel HD Graphics 5500; 8GB (2x 4GB) 1600MHz DDR3 RAM; 1TB 5400rpm SATA SSHD; gigabit ethernet; 802.11ac, 1x1 MIMO; Bluetooth 4.0; DVD ± RW, tray-load; 1x USB 3.0, 2x USB 2.0; HDMI 1.4a; Kensington Security Slot; SDXC card slot; stereo speakers; 0.9Mp webcam and mic; 3.5mm headset jack; UK tiled with numberpad; buttonless trackpad; 40Wh lithium-ion battery, non-removable; 379x260x26.5mm; 2404g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆



PC ADVISOR RECOMMENDED

The Inspiron 5000 Series is the middle of three ranges of business laptops from Dell, with the 3000 Series representing the value models, and the 7000 Series as top Inspirons.

We tested the popular 15in size from the 5000 Series, the 5558 just updated by Dell. There are several configurations from which to choose, all based on the same tough casework. It weighs 2.4kg and feels heavier – in a good way, the stiff chassis suggesting that it could withstand wear, yet with thoughtful touches such as full-length rubber feet ridges on the underside for a stable platform.

A black tiled keyboard with clean action sits on a rubbery grey top deck. The buttonless trackpad was unusually precise, unlike its 5548 predecessor whose cursor could fly off course when clicked. Also changed since the previous model, the 5558 model now includes a DVD writer on the right of the chassis.

A half-depth removable plate covers the underside, allowing access to key components: hard disk, memory and wireless adaptors. This model had 8GB on two cards, a Toshiba 1TB HDD, along with single-stream 11ac Wi-Fi.

There's a choice of screens, all sensibly non-touch; low-resolution 1366x768 or FHD. The full-HD screen in our sample had the decent contrast and off-axis viewability of an IPS panel. Its colour gamut was only 61 percent sRGB but contrast ratio was up at 500:1.

Options for connectivity include just one USB 3.0 and two USB 2.0, HDMI 1.4a for full-rate video to 1440p, gigabit ethernet, and SDXC card slot. Our sample had Windows 10 Pro installed.

The Core i5 processor is clocked at 2.2GHz, rising up to 2.7GHz Turbo when required. The Inspiron will get a little noisy when stressed, a single fan spinning loudly to maintain cool.

Geekbench 3 scored the Dell with 2802 and 5539 points respectively for single- and multi-core operation. PCMark 8 turned in average results, 2291 points in normal Home test, which fell to 2263 points using the GPU to accelerate OpenCL tasks.

The main processor includes HD Graphics 5500 and some models include switchable graphics such as the nVidia GeForce 920M with 2GB DDR3 in our sample.

The discrete graphics capability means you can also play Windows games, with some care in settings to find a workable framerate. Batman refused to run but Tomb Raider managed 37fps set at 1080p resolution and Low detail; or 43fps at 1366x768 and High detail.

The 15-5558 could have better battery life – it lasted four hours 55 minutes in a wireless video test.

In use, the Inspiron 15 felt surprisingly fast and fluid. It was helped along by a high-quality trackpad and excellent screen, providing essential comfort in the human interface to the laptop.



Verdict

The 15-5558 straddles budget and mid-range laptop camps, asserting excellent build quality and decent performance. ☒ **Andrew Harrison**

LAPTOP

Toshiba Satellite C55-C-175

£395 inc VAT

Contact
■ toshiba.co.uk

Specifications
15.6in (1366x768, 100dpi TN gloss display; Windows 8.1; 2.2GHz Intel Core i5-5200U (2.7GHz Turbo) 2C, 4T; Intel HD Graphics 5500; 4GB (1x 4GB) DDR3 RAM; 500GB 5400rpm SATA HDD; gigabit ethernet; 802.11ac, 1x1 MIMO (Intel Dual Band Wireless-AC 3160); Bluetooth 4.0; DVD±RW, tray-load, M-DISC compatible; 1x USB 3.0, 2x USB 2.0; HDMI; Kensington Security Slot; SDXC card slot; stereo speakers; 0.9Mp webcam; dual mics; 3.5mm headset jack; UK tiled keyboard with numberpad; two-button trackpad; 44Wh lithium-ion, non-removable battery; 380x257x23.8mm; 2.2kg

Build: ★★★½☆
Features: ★★★½☆
Performance: ★★★½☆
Value: ★★★½☆



At a little under £400, Toshiba's new Satellite C55-C could be just the ticket for anyone that can't spend much on a laptop. It has a clean, fuss-free design – especially in all-white – and a recent Intel processor lets it run for half a working day.

As a budget design built to a price, it lacks quality in key areas, and Toshiba preloads software (such as web browser toolbars) to claw back revenue from its customers. Not the greatest of starts, then.

Design

The lightweight plastic chassis is in essence that used in other budget Toshibas, with this C55-C missing the token metal veneer found on some models' lids. Available in black or white, our snow-white sample had a fetching pale green trim along all edges. Sadly this proved to be just protective packing tape.

The keyboard is serviceable, with shallow tiled keys and a numberpad. Real buttons on the trackpad are a boon, since some low-quality buttonless types can be tricky to operate, though they require some pressure to click, making long sessions less comfortable.

There's a tray-load DVD writer to the left, plus ethernet, a power inlet and a USB 2.0 port. Poor layout means that it's nearly impossible to press Eject without lifting the laptop. The opposite side features one USB 2.0 socket, one 3.0 port, HDMI and a slot for SDXC cards. For wireless communication there's standard Bluetooth 4.0, plus basic single-stream 802.11ac Wi-Fi.

Inside is 4GB of memory and a 500GB hard disk. Don't expect to upgrade these easily since there are no access doors, nor a removable battery. Any service work will require a workshop strip-down.

The usual casualty when it comes to budget laptops is screen quality and the C55-C is no exception. Its lousy low-resolution panel became unreadable when viewed more than a few degrees off axis. In our tests, contrast ratio was only 80:1 and colour coverage just 60 percent sRGB. Together with its poor colour accuracy of Delta E 10.0, the result is a milky, washed-out image with furry text.

These are the same figures we've seen for most recent budget laptops, including the Satellite L50D and the Asus X555LA (top of our budget laptops charts). If you want or need a better screen, it's advisable to spend a couple of hundred pounds more and get an IPS screen. A good example is the new Dell Inspiron 15-5558 (see page 27).

Performance

Toshiba has fitted a recent Intel Core i5-5200U processor, leading to decent bench results of 2616 points in Geekbench 3. It scored 5201 points when using both Hyper Threaded cores. PCMark 8 results are around average for the price: 2298 in the conventional Home test and 2747 in the accelerated one.

Mind your detail settings and you may just run Windows action games. We recorded an average of 37fps (27fps minimum) in Tomb Raider, wound down to 720p and Low quality. Similarly Batman: Arkham City limped at 30fps at Low and 720p.

With its fixed 44Wh battery, the Satellite ran for five hours four minutes, which isn't terrible but short by today's standards.

Verdict

The Satellite C55-C includes a recent Haswell processor but elsewhere the budget cuts show, especially the poor screen. Upgrading is not feasible, so don't expect to easily fix the limited memory or slow disk storage later. ☒ **Andrew Harrison**

LAPTOP

Schenker XMG U506

£1,585 inc VAT

Contact
■ mysn.co.uk

Specifications
15.6in (1920x1080, 141ppi) IPS matt anti-glare LCD; 3.5GHz Intel Core i5-6600K (3.9GHz Turbo) 4C, 4T; Windows 8.1 Pro; nVidia GeForce GTX 970M with 6GB GDDR5 RAM + (unused) Intel HD Graphics 530; 8GB (2x 4GB) 2400MHz DDR4 RAM; 256GB M.2 PCIe 3.0 x 4 SSD (Samsung SM951) + 1TB 7200rpm HDD; gigabit ethernet; 802.11ac 2x2 MIMO; Bluetooth 4.0; 3x USB 3.0, 1x eSATA/USB 3.0; 2x DisplayPort 1.2, 1x HDMI 2.0; USB Type C; SDXC card slot; stereo speakers; 2Mp webcam; dual array mic; UK tiled with multi-colour backlight; 82Wh lithium-ion removable battery; 387x266x37.5mm; 3.4kg

Build: ★★★★☆
Features: ★★★★½
Performance: ★★★★½
Value: ★★★★☆



PC ADVISOR RECOMMENDED

Looking for the very latest sixth-generation Intel Skylake processor in your next PC? Silicon stocks for mobile may be limited but Schenker UK has managed to cram one into a laptop.

The U506 is powered by a desktop-class Intel Core i5 quad-core CPU, on this model the 6600K variant, although options include 6600, 6700 and 6700K. The all-important graphics for gaming are either nVidia GTX 980M or as here 970M. You can load up to 32GB system memory, and this new generation ushers in DDR4 for the first time. Our sample had 8GB of 2400MHz on two sticks.

Storage options abound. There are four bays available, two each for 2.5in SATA and M.2 2280. And its M.2 spec goes all the way to PCIe 3.0 x4 NVMe. Schenker is currently fitting up to Samsung SM951 (AHCI), but 950 PRO (NVMe) will soon follow.

Thanks to the desktop-class CPU and X170 chipset, this machine also packs Thunderbolt 3.0 and USB 3.1 on a combined USB-C port, beating even Apple to market with 40Gb/s Thunderbolt.

Ordinarily, fitting desktop CPUs to notebooks is a complete no-no for reasons of heat and battery demand, yet this chip's TDP of 'only' 91W using latest Skylake power management really works here. The generous 38mm chassis, two fans and plentiful heatpipes assist thermal management. In use, fans were no louder than other gaming laptops; and with its 82Wh removable battery the U506 survived two hours 23 minutes of streaming video wirelessly through its 2x2 802.11ac Wi-Fi.

Build quality is outhouse-class, chunky and utilitarian, but eminently serviceable, with two slide-off underside plates for component access. It's an enthusiast machine through and through. The display is another crowning achievement, a matt IPS panel with superb image quality and little glare. The full-HD panel had up to 630:1 contrast ratio and 90 percent sRGB gamut.

Performance

NVidia 970M graphics are central to gameplay, allowing maxed-out settings for one display in typical games. With 6GB of memory, two DisplayPort 1.2 and HDMI 2.0 you can also connect external displays.

With G-Sync disengaged, the U506 averaged 113fps in High-detail Tomb Raider, and 58fps set to Ultimate. Batman: Arkham City started at 115fps and was still playing 86fps in top Extreme mode.

Averaging 27fps, Metro: Last Light in Very High with all effects could be upgraded to 88fps by simply reducing effects and setting to High instead.

Beyond gaming, it averaged 12784 points in Geekbench 3 from this non-Hyper Threading 3.5GHz CPU; or a record-beating 4182 points single-core. PCMark 8 Home returned a round 4000 points, very much a superior desktop result.

Verdict

Slipping a performance desktop PC processor into a laptop may seem lunacy, but Schenker gets away with it, aided by the 14nm Skylake architecture. How much it actually helps gaming is moot, since we've seen nVidia GTX 970M run as fast, or faster, in laptops with mobile-class chips. Besides benchmark-busing results, Skylake also means state-of-the-art connectivity such as Thunderbolt 3. As a workstation – gaming or CAD – the chassis and top components make a powerhouse with real performance to spare.

☒ **Andrew Harrison**

SMARTPHONE

Apple iPhone 6 Plus

£619 inc VAT

Contact
■ apple.com/uk

Specifications
5.5in (1920x1080, 401ppi) 1080p display A9 chipset; iOS 9; 2GB RAM; 3D Touch; 12Mp rear facing camera; 4K video recording; Live Photos; front-facing 5Mp camera with display flash; Bluetooth 4.2; dual-band Wi-Fi; NFC; 158.2x77.9x7.3mm; 192g

Build: ★★★★½
Features: ★★★★½
Performance: ★★★★½
Value: ★★★★☆



It may not slip off the tongue as easily as iPhone 6 Plus, but the 6s Plus is better in almost every way. Being an 's' model, it doesn't have looks to distinguish itself as the new phone. But, as Apple's ads say: "The only thing that has changed is everything." That's stretching the truth, of course, but a lot has changed. S models retain the same physical design of the previous year's model, but get upgraded internals and some new features. This year is no exception.

Price

This is one thing that hasn't changed: the 6s Plus costs exactly the same as the 6 Plus did when it launched in 2014. So it's £619, £699 and £789 for the 16GB, 64GB and 128GB options. Let it be said early on that 16GB is unacceptably meagre, inappropriate even, for a phone without expandable storage, which records 4K video that consumes almost 400MB per minute.

The new model means the 6 Plus gets a price cut, so if you do buy your phones SIM free, you'll save a bit by opting for last year's model.

Design

The 6s Plus is a great-looking phone and it feels great in the hand. Looks are subjective though, and whether or not you hate the protruding camera, you're likely to immediately wrap your new phone in a case to protect it from scrapes and knocks.

We prefer a bigger screen, so it's not a great compromise to carry a device that's larger and heavier than the 6s. It is bigger than some Android phones which have even bigger screens, but none of those devices – Nexus 6P, Galaxy S6 Edge+, Moto X Style (see page 34) – will fit any more easily into a pocket.

Of course everything we said in our review of the iPhone 6 Plus about design applies to the 6s Plus. Both good and bad. It's still an annoyance that the power button is opposite the volume buttons, as it's easy to turn off the phone instead of increasing volume or taking a photo with the same button.

It's still a two-handed phone for a lot of the time, and Reachability doesn't really help all that much. It's quicker and easier in most cases to use your other hand to tap on something at the top of the screen.

The two phones may look identical, unless you opt for the new Rose Gold version, but Apple has used stronger 7000-series aluminium for the 6s and 6s Plus. Almost certainly as a response to Bendgate. This means that the 6s Plus is 20g heavier at 192g, which makes it one of the heaviest 5.5in phones we've seen, though it's more than light enough to hold one-handed to watch videos.

There are some other subtle differences. The home button, for example, has a very slightly different sound and feel to it, and if you put a pair of callipers on it, the new phone is very fractionally thicker. Yet, so far, we haven't found a 6 Plus case that won't fit on the 6s Plus.

Display

The screen, too, is the toughest yet. It has to be since Force Touch means you'll be prodding and pushing the screen reasonably hard to use the new Peek and Pop gestures, which respond to pressure. It's almost like having a resistive and capacitive screen in one, but with better image quality than any resistive screen.

3D Touch is the biggest new feature of the 6s Plus and offers a new way to interact with iOS. Since it's a new feature there's not an awful lot you do with it, but what you can do is undeniably useful. You can press hard on an app icon and, using the new Quick Access shortcuts, jump straight to a particular function or place. With Mail, for example, you jump straight into writing a new message or to your VIP inbox. You can do the same with Messages, or send a message to your most frequent contacts.

Using Quick Actions on the camera app allows you to take a selfie without having to launch the app and then change modes.

Within apps you can use Peek and Pop. Pressing lightly on an email in your inbox lets you 'peek' at it without actually opening it. Yet you can still swipe left to delete it or swipe up to reply. If you

want to read the whole message, pressing harder while peeking makes it 'pop' open. Within an email or message, you can Peek at websites or maps of addresses that people have shared with you.

There's another great use for 3D Touch: press hard on the virtual keyboard when typing and it turns into a touchpad, letting you move the cursor and select text.

Less useful, but a fun feature to show off to your non-iPhone 6s-owning friends, is Live wallpapers. Apple has a small selection of top-quality images, which animate when you press hard on the screen. (You can also set new Live photos as your lock screen wallpaper. More on those in the cameras section.)

The impressive thing is that the animation plays faster if you press harder, aiding the 3D feeling: this isn't just a two-level pressure-sensitive screen.

Accessibility hasn't been forgotten, either. 3D Touch is a great benefit if you're blind or partially sighted. You can set it so that the Quick Action menus are read aloud, and for previews to be read out when 'peeking'. Plus, in the 3D Touch accessibility menu, you can set the sensitivity to light, medium or firm, which will help those that can't push hard enough or lack the dexterity to press lightly.

Apple has also added a 'Taptic Engine', which offers quicker response than a traditional vibrating motor. It's the same system that's used in the Apple Watch and is certainly an improvement over the 6 Plus' motor. The vibrations help you to know when you've pressed hard enough on the screen, but they may be too subtle for some.

Like Siri, you could ignore 3D Touch entirely. But to do so would be to miss out on the ability to get stuff done faster. (If you have an iPhone with Siri and don't use it, you really should.) App developers can use 3D Touch, but it will be a while before they're a regular feature.

In terms of specs, the screen is otherwise the same: 1920x1080, 401ppi, IPS technology, 100 percent sRGB coverage. It's a great screen, with virtually nothing to complain about. For those who think Apple should have made it Quad HD, there's just no reason to go any higher than 400ppi.

The cover glass might be tough, but if you break it, it'll cost you £126.44 to get it fixed, unless you have AppleCare+, in which case you need only pay the excess fee. That's £20 more than for the 6 Plus (and 6s) and £40 more than the iPhone 6.

Performance

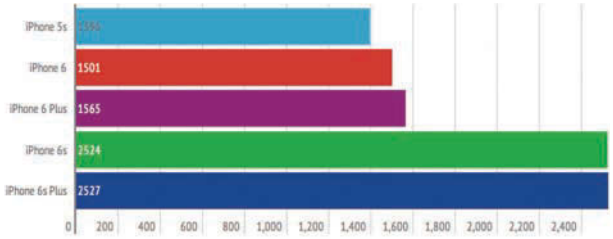
As with any new iPhone, there's a new processor in the 6s Plus: the A9 and M9 motion coprocessor. Apple has also increased RAM from 1- to 2GB. You can see how this affects performance in our benchmark graphs (right and on page 33).

In real-world use, the 6s Plus doesn't feel twice as fast as the 6 Plus, but both are powerful phone and it's only when they age (and get future iOS updates) that you'll need the 6s Plus' extra grunt.

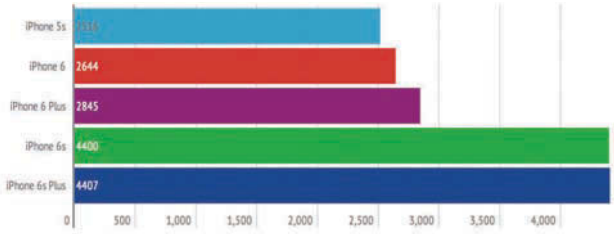
Apps launch very quickly, and there's hardly any delay when switching between apps in iOS 9. There's never a sense that the 6s Plus is struggling due to a lack of speed. The Touch ID sensor is noticeably quicker though, and is so fast to recognise your fingerprint that you'll have to use an unregistered finger if you want to merely check the time and notifications without unlocking your phone. Most of the time, a quick press of the button with a registered finger is enough to turn on and unlock in one smooth movement.

Despite the extra weight, the battery is smaller in capacity compared to the 6 Plus: 2750mAh against 2915mAh. However, the die shrink from 20- to 14nm means

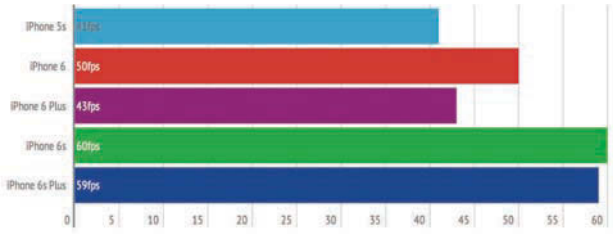
Geekbench 3 Single-core



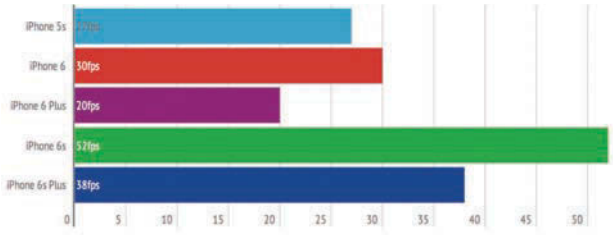
Geekbench 3 Multi-core

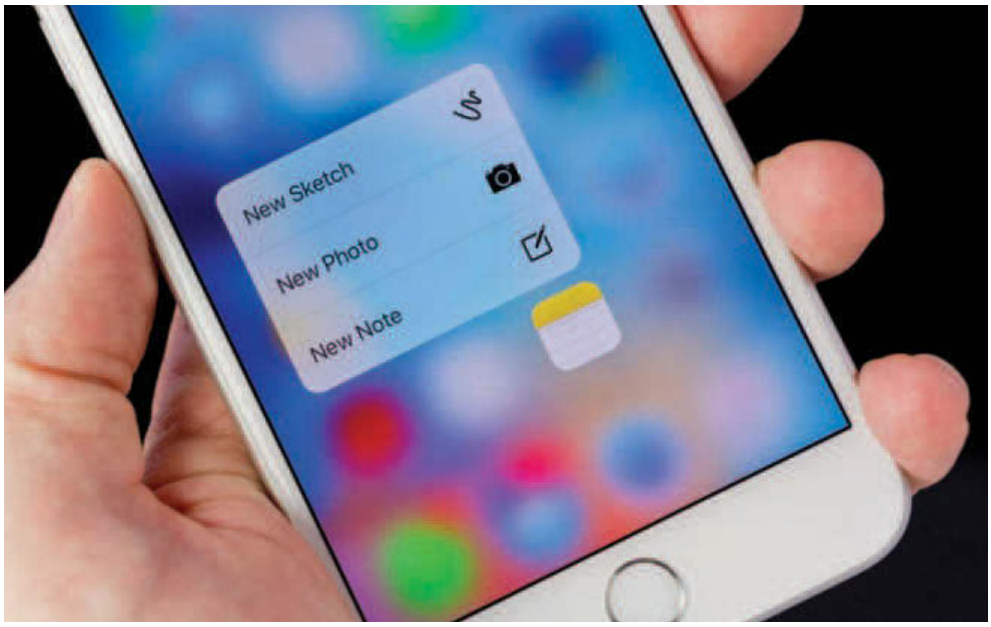


GFXBench GL T-Rex



GFXBench GL Manhattan







that the A9 processor is more power efficient.

iOS 9 also introduces – finally – a battery-saving mode. So while battery life should be the same as for the 6 Plus in spite of the 3D Touch screen and faster processor, you can eke out even more time between charges by letting Low Power mode switch on when the battery gets down to 20 percent. It turns off features, including push email, and lowers power consumption by decreasing the screen timeout and screen brightness.

In our tests, we found this works well, and so far we've been able to just about get through two days if we're not hammering the phone throughout each day. It helps to quit apps that use too much power in the background (even going as far as disabling background updates for apps such as Facebook if you can handle it), but suffice to say that the 6s Plus will comfortably get through a single day even with intensive use.

Cameras

There was disappointment when the iPhone 6 and 6 Plus launched with cameras that had the same basic specs as the iPhone 5s. Now there's a significant upgrade, a huge jump from 1.2- to 5Mp on the front-facing camera. Apple has lagged behind Android phones for a long while in this respect. While FaceTime or Skype chats were perfectly reasonable, selfies or any other photo or video that had to be taken with the front camera were disappointing at best (when compared to the rear camera).

Now, selfies are respectable and not just for viewing in tiny versions on Facebook or Instagram. The flash isn't as successful. In dim conditions, the screen will flash briefly to light your face, but the effect it has is to make a bigger disparity between the darkness of the background and the brightness of your face. It's not all that flattering.

However, it can make all the difference and at least give you usable photos. Plus, skin tones are pretty good thanks to the fact that screen flashes different colours depending on the white balance of the scene – much like the True Tone flash at the rear.

Also new is live photos. These capture 1.5 seconds of slow framerate video when you take a photo. Then, when you're browsing pictures later, you can use 3D Touch to press on the screen and make the still photo come to life. Apple is preparing an update, so the recording is cut short if it detects you're moving the phone away. Currently, many live photos end with you putting the phone down or in a pocket. Whether they will take off and not remain a gimmick depends on support from Facebook, Instagram and the ability to share them with more than just other iPhone and Apple Watch owners (El Capitan also supports live photos).

Getting to the rear camera, the pixel count has been increased from 8- 12Mp. That's not as significant as it sounds, and photo quality isn't drastically different to that of the iPhone 6 Plus. You won't be able to scroll through your camera roll after upgrading and immediately tell at which point you switched to the 6s Plus. The above photos reveal why. They were taken seconds apart, then resized and aligned (sort of) in Photoshop:

So there's no earth shattering difference in detail and resolution, but that's not to say photos aren't great. Far from it. The 6s Plus takes excellent photos in virtually all conditions, just as previous iPhones have. It's this fact that makes the iPhone such a great camera: it's reliable and consistent. Exposure, focus and colour are all great most of the time. There is more detail, but you're not going to notice it unless you zoom in or need to crop a photo.

Apple talked of deep trench isolation at the 6s' launch, which basically means light should fall on a pixel and not on its neighbours, leading to better colour. The colour filter has also been moved directly on top of the pixels to help with this.

However, in order to add 50 percent more pixels, it has had to make them physically smaller, down from 1.5- to 1.22µ. Yet the maximum aperture remains f/2.2, which doesn't let in as much light as some Android rivals with f/2.0 or even faster. This comes at a cost: noise.

It's hardly rampant, but when you look closely at photos taken in anything other than bright light, you'll see noise. It's also evident in videos shot in low light.

Video enthusiasts are in for a treat since there's now support for 4K. Proper support. You're limited to 30fps, but you still get stabilisation; optical stabilisation is only found on the 6s Plus, and unlike on the 6 Plus is now used when shooting video for an even more cinematic feel. Optical stabilisation makes a huge difference, and with steady hands you really can get some professional-looking footage. The A9 processor is powerful enough to process and edit 4K video right on the phone. Just bear in mind it costs a lot in terms of storage: 375MB per minute.

Detail is, of course, fantastic, and quality is right up there with the best phones that can capture 4K. Sadly, Slo-mo and Time-lapse can't be shot in 4K, though both of those features deliver great video.

Add some lenses, such as wide-angle and telephoto from Olloclip or – if you can afford them – Schneider, and you'll get some outstanding near-broadcast quality footage.

The bad news is that you have to dive into the Settings app to change resolution for video and framerate for slo-mo. It's no longer a toggle within the camera app in iOS 9. Being able to shoot 1080p at 60fps is wonderful when light is good, but try and grab a clip indoors at night and you'll be faced with a black screen and a 30-second mission to flip back to 30fps.

Software

iOS 9 looks very similar to iOS 8, but there are lots of useful little changes that make it easier to navigate and use. One of the best is the 'Back to' link at the top left, which appears when you tap a link that fires you into another app. It means a quick tap is enough to return to where you were instead of going to the home screen first, or double-tapping the home button and using the task switcher (which now looks just like Android's).

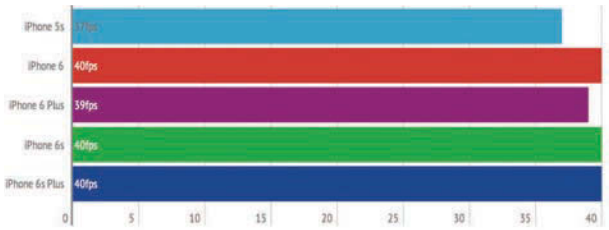
There's another one to pick out: Notifications are now ordered by time, not app. It's actually useful now, and you can dismiss alerts by day. There's still no 'dismiss all' button, but it's a positive improvement nonetheless.

And, of course, there are scores of other updates and improvements throughout the operating system.

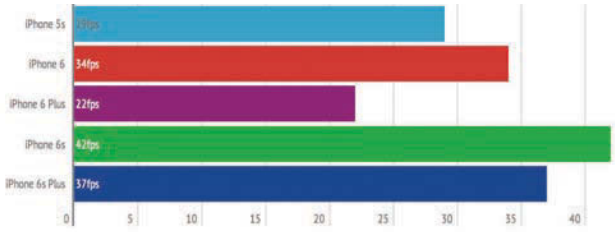
Verdict

The 6s Plus is a remarkable device, and it's without doubt the best iPhone Apple has ever made. Just don't buy the 16GB model, which doesn't have nearly enough storage. Few other phones are launching with screens under 5in which – if anything – makes the iPhone 6s look too small and the 'giant' 6s Plus normal. 3D Touch can sound gimmicky, but it's absolutely not. It requires effort to force yourself to use it to begin with, but it quickly becomes second nature, and it will be fascinating to see how app developers put it to use in apps and games. If you've already got an iPhone 6 or 6 Plus it's hard to justify the upgrade for 3D Touch and the improved cameras. But for anyone with an iPhone 5s or earlier, there's a world of difference and it's a thoroughly worthwhile purchase. ☒ **Jim Martin**

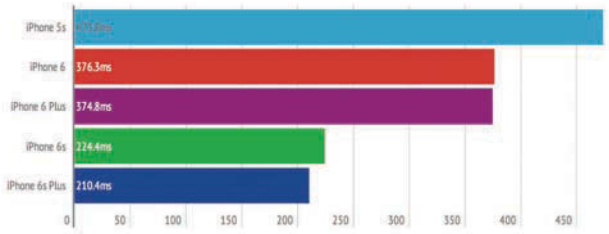
GFXBench Metal T-Rex



GFXBench Metal Manhattan



SunSpider*



*** lower is better**



SMARTPHONE

Motorola Moto X Style

£359 inc VAT

Contact
■ motorola.co.uk

Specifications
5.7in TFT LCD display, Quad HD (1440x2560) 520ppi; Android 5.1.1 Lollipop; 1.8GHz hexa-core Qualcomm Snapdragon 808 processor; Adreno 418 GPU; 3GB RAM; 32/64GB built-in storage, up to 128GB microSD card slot; 3000mAh battery with turbo charging; water resistant IP52; 4G LTE; 802.11ac Wi-Fi; 21Mp rear camera with dual-LED flash ;5Mp front-facing camera; Bluetooth 4.1 LE; front-facing stereo speakers; NFC; GPS 153.9x76.2x6.1-11.06mm; 179g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★½

★★★★☆

As you might expect from a smartphone called the X Style, Motorola has created a good-looking device. There's a lot more to this phone than good looks alone though, as it also has great specs and an impressive big screen.

Design

The Motorola Moto X Style is available in a wide variety of different colours and finishes, so you can pick the one that suits you best. Materials include Saffiano leather or real wood, and you can pick metallic accent colours or engrave your name thanks to the Moto Maker tool. In total, there are 18 different inlays in various colours and materials, and seven different accent colours to choose from.

Of course, that's if you use the Moto Maker (tinyurl.com/oozy4dL), which is a big draw of the Moto X Style. The standard models are white or black, with a plastic rear cover.

In terms of size, the Moto X Style is 154mm long, 76mm wide and 6.1mm at its thinnest point, 11.06mm at its thickest. So thanks to tiny bezels around the screen (which we'll talk more about in a moment), it manages to avoid being big and bulky despite its large display. It also feels pretty light, at 179g, and is comfortable to hold thanks to the curved back.

Unfortunately, the Moto X Style isn't waterproof like the new Moto G. Instead it's splash resistant, so should be ok if a bit of rain or sweat finds its way onto it but you won't want to drop it into the sink or spill a drink on it.

Display

The Moto X Style has a stunning Quad HD (520ppi) 5.7in display with teeny tiny bezels that, as we've said, means the overall size of the device isn't too huge. Still, the size isn't going to suit everyone. We'd have liked it to be closer to the 5in mark like the Moto G, but it's all down to personal preference and clearly Motorola thinks bigger is better for most people.

That screen should be durable too, as it's made with Gorilla Glass 3. During our tests, we found the screen was bright, crisp and colourful, and an absolute joy to look at. It's perfect for watching movies and playing games, and it definitely gets close to the amazing quality of the screens on high-end smartphones including the Samsung Galaxy S6 and the LG G4. The photo above shows it off well.



Features

Inside the Moto X Style is a hexa-core 1.8GHz Qualcomm Snapdragon 808 with Adreno 418 graphics. That's paired with 3GB RAM, so you should find this a speedy smartphone that's capable of more or less anything you throw at it. As you can see, the benchmark results (shown opposite) are good, but more importantly we found the phone to be lovely and smooth during everyday use. This is partly, we feel, down to having in essence a stock version of Android (more on this later).

Storage options are 32- or 64GB, with a microSD card slot that supports up to 128GB, so you won't be run out of space any time soon. It's the first time we've seen a microSD card slot on a Moto X phone and it's a welcome addition.

Inside the X Style is a 3000mAh battery, which Motorola says will last 'all day'. In our benchmark test, however, it lasted just four hours 24 minutes, which is a fair way behind most phones. The Galaxy S6, for example, which also has a Quad HD screen lasted nearly seven hours. Realistically, you'll be charging every night even if the phone hasn't run out of power completely.

The Motorola Moto X Style is available in a wide variety of different colours and finishes, so you can pick the one that suits you best

Easing things in this area is Turbo Charging, which means you'll get 10 hours of battery life from 15 minutes charge time, plus a power adaptor is provided with the phone, which isn't always a given, with some rivals making it an optional extra.

You'll also find front-facing stereo speakers with Smartboost, which is great if you plan on watching movies without headphones or enjoy playing games on your smartphone, particularly when paired with that stunning display.

When it comes to connectivity, you'll find Bluetooth 4.1 LE, Micro-USB charging (not Type-C), a 3.5mm headphone jack, 802.11ac Wi-Fi and 4G LTE, as well as NFC and GPS.

Camera

The Moto X Style has an impressive, 21Mp camera on the rear and a 5Mp offering on the front. That front snapper also has a wide-angle lens for improved selfies that can capture more of what's around you, and even includes a Night mode and flash. The pixels are bigger at 1.4 microns, too. Using the Actions part of the Moto app (see below), you can launch the camera with a double twist of your wrist.

Taking a closer look at the rear-facing camera, it has an f/2.0 aperture, phase detect autofocus, a dual-tone LED flash, 4x digital zoom and the Night mode, as well as Burst mode, Auto HDR, Panorama, 4K video with stabilisation at 30fps or 1080p HD video at 60fps. There's also Slow Motion and Video HDR capabilities.

During our testing, we managed to capture some great photos both of people mingling and still-life objects. It seems to work well in low-light, too. We also found it to be very good during our longer period of testing the final unit.

Like many phones, it shoots at a lower resolution to achieve a 16:9 aspect ratio but you can switch to 21Mp if you don't mind 4:3. Also note that HDR is automatic by default and we'd recommend turning on touch to focus to get the best results. See our test shots below without and with HDR, shot with full resolution.

Software

The Moto X Style comes with Android 5.1.1 and doesn't stray far from the stock, vanilla operating system designed by Google. In fact, Motorola's devices are probably the closest thing you can get without buying a Nexus phone. That's a real plus point for us.

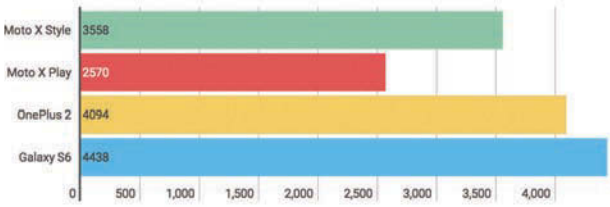
On top of the usual Android features, you do get some decent Motorola add-ons. For starters, Migrate will help you move content from your previous phone, while the Moto app is the new combined home for the firm's other services including Assist, Voice, Display and Actions.

It's well worth checking out these extras, which can do a number of handy things such as give you notifications without switching the screen on fully, automatically go silent when at work (for example), launch the camera with a twist of your wrist and read text messages out when you're driving.

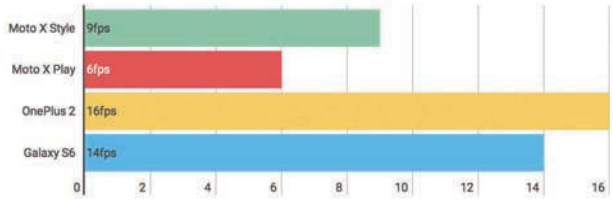
Verdict

If you're looking for a big screen phone, then the Motorola Moto X Style is a great choice. It's got great specs across the board and it's cheaper than rivals such as the Google Nexus 6P and Samsung Galaxy S6 Edge+. We love the screen, the stock version of Android and the cameras. However, it really stands out when using the Moto Maker to customise the smartphone, though this costs more. **Chris Martin**

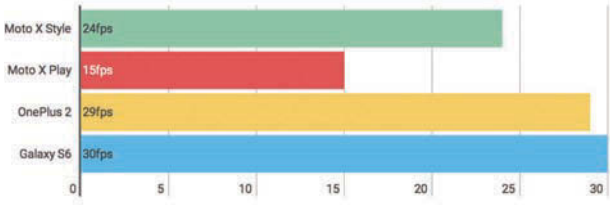
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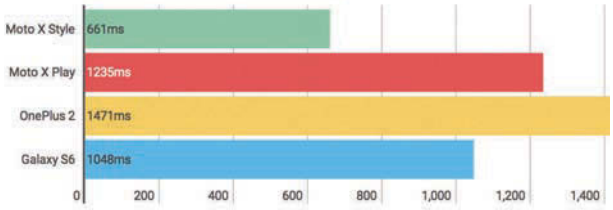
GFXBench Manhattan



GFXBench T-Rex



SunSpider*



* lower is better



SMARTPHONE

Sony Xperia Z5

£549 inc VAT

Contact
■ sony.co.uk

Specifications
Android 5.1 Lollipop; 5.2in Triluminos Display IPS (1080x1920, 424ppi); 2.2GHz Octa-Core Qualcomm Snapdragon 810 CPU; Adreno 430 GPU; 3GB RAM; 32GB internal storage; microSD slot (up to 200GB); 23Mp rear camera AF with LED Flash; 5Mp front camera; video recording at up to 2160p; Wi-Fi up tp 11.ac; Bluetooth; NFC; 4G LTE Cat 6; Nano-SIM; 2900mAh battery; Dust and waterproof (IP68); 72x146x7.3mm; 154g

Build:
Features:
Performance:
Value:



With technology in smartphones hitting something of a ceiling, it's hard to differentiate in a crowded and fierce market. Sony, like HTC and others, is finding it hard to compete with the likes of Samsung and Apple, but hopes the new Xperia Z5 will give it a needed boost.

In terms of design, Sony hasn't really changed its formula, which has been in place since the original Xperia Z. The Xperia Z5 has that square industrial style, look and feel that makes it instantly recognisable as a Sony handset. That said, there are some tweaks, which are nice.

In our opinion, the Z5 looks more desirable than previous models. This is largely due to the new frosted glass rear cover that gives it a matt finish, and the graded metal frame, which matches the colour of the phone. Colour options incldue white, gold, graphite black and green.

Once again, Sony offers full waterproofing and there's only one flap to cover the card slots, so you don't need to faff around with headphone or USB ports, which makes things hassle-free. The iconic round power button has gone, here replaced by a flat and slightly recessed button, which also houses a fingerprint scanner.

Something we don't like, although it's a small detail, is that the volume rocker has been moved further down the side of the phone. It's now close to the bottom and, in our tests, we found it difficult to use – above the power button seems to make more sense.

Unfortunately, the device is thicker and heavier compared with the previous model. It's now 7.3mm and 154g, compared to 6.9mm and 144g. Although that's not a big difference, the Z5 doesn't feel as nice in the hand compared to its rivals. The square shape just isn't as ergonomic, and there are places where the edge of the glass or metal is sharp. This might seem like a small thing to point out but in day-to-day life it matters more than, say, a few extra frames per second in a graphics benchmark.

Hardware

Let's get a couple of things out of the way on the specs side of things. The Xperia Z5 still has a 5.2in screen with a Full HD resolution, so that's the same as the Xperia Z2. The new screen tech is found on the Xperia Z5 Premium, which is the first 4K smartphone we've seen.

The quality is still good, but we would have preferred it if the regular Z5 was Quad HD. The only new thing to talk about here is that the display can be used normally even when covered in water droplets.

Another thing that remains the same is that the Z5 has a Snapdragon 810 processor. We found the phone extremely nippy in use, even launching the camera.

In normal use it doesn't overheat like the Xperia Z3+. However, it can if you push it hard enough. When recording 4K video we got a warning at around 19 and a half minutes – an icon notifies you of the high temperature, too – but we did reach 30 minutes of continuous recording without the camera switching itself off.

Benchmark results are good, outpacing its predecessor and keeping up with rivals across the board (see our tables opposite).

RAM remains at 3GB, plus there's 32GB (21GB available on our sample) of internal storage and a microSD card slot, which can accept up to 200GB. It's good to see Sony sticking with expandable storage with so many devices (the OnePlus 2, iPhone 6 and Galaxy S6 to name just three) not having this feature.

The Xperia range has long touted good battery life and the Z5 is no different with Sony still claiming two days of usage. The still non-removable battery is 2900mAh in capacity, which is oddly 30mAh lower than the Z3+. You'll be able to quick charge the phone, getting five and half hours usage from a 10-minute charge – however, the QCH10 charger is not included in the box and will cost you £19 from Sony.

In our battery benchmark test using Geekbench 3, we recorded a time of five hours 37 minutes with a score of 3376. This is respectable but just over an hour short of rivals like the Galaxy S6, which we didn't expect due to the lower-resolution screen. We have found battery life to be good from a user point of view and should last most of the advertised two days.

So what has changed? Well Sony is going big on two features: the

new camera and the fingerprint sensor. Sony admits that it's a bit late with a fingerprint sensor, but it's managed to do something a bit different. Yes, it's inside a button like rivals, but the firm has put it inside the power button. This is firstly impressive since it sits on the side and is slim, but also means it's a much more ergonomic placement – exactly where your thumb naturally falls when you pick up the phone, so all you need to do is push the power button and the sensor reads your print at the same time. It's consistently quick and accurate.

Now on to the camera, which is new for the first time since the Z1. The Z5 now has a 23Mp main camera (1/2.3in and f/2) with various improvements and features – it's the same camera on the Compact and Premium models, too.

For starters we'd like to give Sony a nice round of applause for keeping with the two-stage dedicated physical camera button on the side, which not only launches the camera app whenever you need, but also makes taking photos easier.

Aside from the higher resolution of the sensor, Sony is touting three main improvements for the camera. It has the fastest autofocus on the market, according to the firm, at 0.03 seconds, plus thanks to a hybrid system it also has x5 Clear Image Zoom for better results when you zoom in on an object, and it also provides the clearest low-light performance.

Sony sets the camera to 8Mp by default, so you'll have to head into the settings to switch to the full 23Mp compliment, which will shoot in 4:3. This is perhaps to avoid larger files filling up the internal storage and/or oversampling for the Clear Image Zoom feature.

Going back to what Sony says about the camera and that autofocus is incredibly fast. Perhaps not 0.03 seconds every time, but it's one of the quickest we've seen.

The Clear Image Zoom feature seems to be nothing more than marketing as we've not found it to be particularly good. In fact, a photo taken at x5 compared to zooming in on a full-frame still is better. As usual, you'll want a camera with optical zoom if you want good results in this respect.

Low-light performance is good, but the Z5 lacks optical image stabilisation, which plays a big part in stopping shots in poor conditions ending up a blurry mess. For most users, the camera will provide excellent photos and video using Superior Auto Mode and there is a load of other camera apps to play with, including Manual, Multi Camera and the slightly odd AR Mask, which lets you have the face of a gorilla or even one of your mates.

Software

Sony hasn't done much on the software side with the Z5 range – it's really all about the design and hardware. The Z5 ships with 5.1 Lollipop and Sony will, of course, make Android 6.0 Marshmallow available for the Z5 range, but there's no timing for the upgrade at the time of writing.

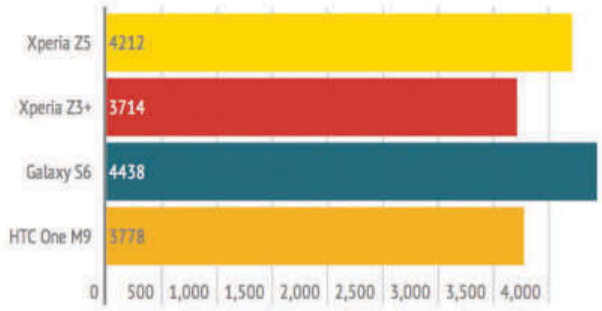
On top of the stock Android elements such as recent apps, Sony still adds its floating widgets giving you things like a calculator, timer and even a web browser, which can be resized and pinned to the side when not in use. We also welcome the ability to customise the quick settings, so you can make sure the ones you use the most are there.

We're seeing much less fragmentation with Android these days and Sony is one smartphone maker which doesn't mess too much with the vanilla interface. It does have the firm's usual style and add-ons such as nice wallpapers, widgets and apps such as PlayStation. All of which are welcome, but there is a bunch of other pre-loaded apps such as Facebook, Amazon Shopping, and AVG, which we're not so keen on. We think users should be the ones to decide which apps are installed.

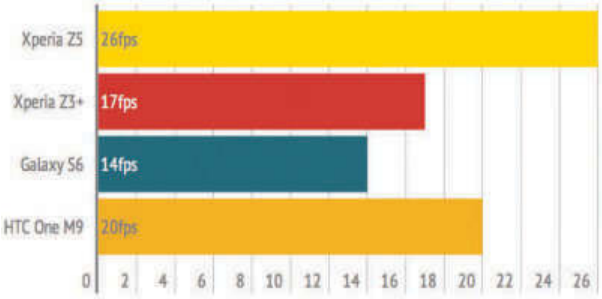
Verdict

There's no doubt that the Xperia Z5 is a solid flagship smartphone from Sony and an improvement on the Z3+. We like the new frosted glass rear cover and the addition of a fingerprint scanner in that slim power button. Once again, the camera is great, but tough competition means rivals are now available for a lot less. Once the price drops this will be a great option for anyone looking for a waterproof flagship with a microSD card slot, but we'd like the Full HD screen to be Quad HD and the design just isn't as nice in the hand compared to rivals. **Chris Martin**

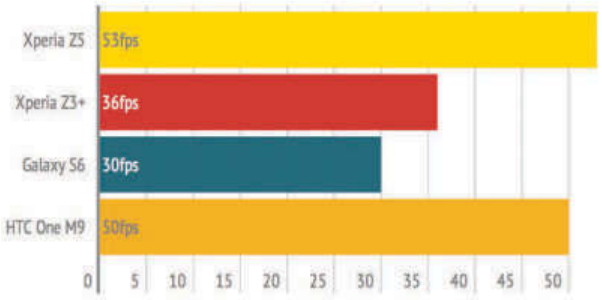
Geekbench 3



GFXBench Manhattan



GFXBench T-Rex



SunSpider*



* lower is better

SMARTPHONE

Sony Xperia Z5 Compact

£429 inc VAT

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■ sony.co.uk

Specifications
Android 5.1 Lollipop; 4.6in IPS (720x1280, 323ppi); 2.2GHz Quad-Core Qualcomm Snapdragon 810 CPU; Adreno 430 GPU; 2GB RAM; 32GB internal storage; microSD slot (up to 200GB); 23Mp rear camera AF with LED Flash; 5Mp front camera; Video recording at up to 2160p; Wi-Fi up to 11.ac; Bluetooth; NFC; 4G LTE Cat 6; Nano-SIM; 2700mAh battery; Dust and waterproof (IP68); 65x127x8.9mm; 138g

Build: ★★★★☆
Features: ★★★★½
Performance: ★★★★☆
Value: ★★★★☆



Sony doesn't do a mini version of its flagship smartphone every time, but it has once again with the Xperia Z5 range, and we're pleased to see a new smaller handset again following the Xperia Z3 Compact.

Design

We've always been a fan of Sony's Compact phones, and although the new model doesn't look massively different to previous offerings, it's got some new design features to show off. Like its bigger brother (see page 36), the frosted glass rear cover looks good and the graded metal frame also adds to the style. It has a more premium finish this time around.

We're not convinced by the flat sides though, which make the phone feel a little brick-like and chunky. The finish on the metal frame also means that's it's difficult to grip. Colour options include black, white, yellow and coral colour options.

As with the regular Z5, the Compact is thicker and heavier compared to its predecessor even though Sony says it has the same footprint – it's now 8.9mm and 138g, compared to 8.6mm and 129g. That's not a huge difference and it's accentuated by the flat sides, but it's not the right direction to be going in.

Another strange thing about the design, which we also found on the Z5, is that the metal frame doesn't sit flush with the front and rear glass. This creates a slightly sharp edge, which can be uncomfortable. We did find it less of a problem on the Compact, but it's nevertheless a loss of build quality compared to even the original Z1 Compact.

As we found with the larger Z5, the volume rocker on the Compact is too far toward the bottom of the phone to be comfortable – we're not sure why Sony didn't put it the other side of the power button.

You'll notice that the power button looks different to the round offering of previous phones. This is because it now has a fingerprint scanner built in, which is quick and accurate. Plus, having it on the side makes more sense than any other implementation, as it's where your thumb naturally sits on the phone.

Sony hasn't decided to drop any key design features either, so the Z5 Compact is still waterproof IP68 – with only one flap for the card slots.

Hardware

The Z5 Compact has some new hardware, though it's a shame to see the screen still at 4.6in and 720p – we would have liked to see an upgrade to Full HD. That's not to say that the display isn't good, but it's not an area that will compel existing owners to upgrade for.

Sony has confirmed that some users may find issues with the touchscreen's responsiveness, however, it told us that a software update will fix this issue.

There's still 2GB of RAM and 16GB of storage, although our sample had 32GB (21GB available), plus there's a microSD card slot, which can take up to 200GB.

The processor inside is a Qualcomm Snapdragon 810. This is a nice upgrade from the Z3 Compact, which has a Snapdragon 801. Sony has to be applauded for once again making sure that many of the specifications remain the same as the regular model, instead of downgrading various specs.

With excellent performance, the Z5 Compact is snappy in more than just camera department. The benchmark numbers (shown opposite) are very impressive, but during our tests we found that not everything was instantaneous all of the time.

Inside the Xperia Z5 Compact is a 2700mAh battery (up from 2600mAh on the Z3 Compact) and Sony touts two days battery life. There's no wireless charging, but you can use a QCH10 charger to get five-and-a-half hours usage from 10 minutes plugged in – although Sony doesn't provide a charger in the box.

In our battery benchmark, the Z5 Compact lasted a middle-of-the-road four hours 57 minutes, with a score of 2970. That's neither impressive

> Although the new model doesn't look massively different to previous offerings, it's got some new design features to show off

nor poor, but most users will get the advertised two days of usage before needing to charge – unless you hammer it with tasks like gaming, shooting video and watching video.

Other specifications to mention include 11ac Wi-Fi, Bluetooth 4.1, NFC and 4G LTE support. If you want things like a heart-rate monitor, you'll need to look at Sony's rivals. It's a shame that the notification LED is on the front next to the light sensor rather than stylishly combined into the strip earpiece.

As well as the processor staying the same compared to the flagship model, the 23Mp camera is also a key feature of the Z5 Compact. It's worth noting that you'll need to head into the settings to shoot at 23Mp, but Sony has intended it to be used at 8Mp, with the remaining pixels used for oversampling.

The camera is supposedly the fastest to focus at just 0.03 seconds, offers x5 Clear Image Zoom and has the best low light performance.

We can certainly vouch for the quick autofocus system, which locks on without delay almost every time. It's easily one of the fastest we've ever seen on a phone, and will help to avoid missing moments.

Shooting in 8Mp does help for zooming in, but doesn't always produce the best results. If you like detail and sharpness, you might be better off switching up to 20- or 23Mp shots. The bottom line is that Clear Image Zoom isn't what Sony makes it out to be – get a proper camera if this is a big deal.

While some low light shots can come out well, the lack of optical image stabilisation is a big hindrance here – again, Sony's claim of being the best isn't true.

It's a good camera, but the problem is that Sony is making it out to be the best you can buy in a smartphone and we just didn't find that to be the case.

To sum up the hardware situation, it's a shame to see 720p as the screen resolution but the display is smaller than the Z5's and the key thing here is that you're getting the same high-end specs (although there's 2GB of RAM). Sony has impressed us before with this and has done so once again here.

Software

With some design and hardware changes, there's little to say about the software on the Z5 Compact, which comes preloaded with Android 5.1 Lollipop. Sony has confirmed that it will be upgraded to Android 6.0 Marshmallow at a later date.

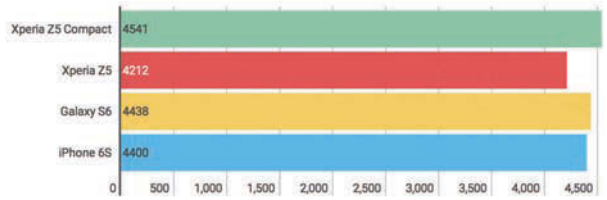
Existing Sony users will be instantly at home with the user interface, which looks almost identical to previous versions. Much of it is stock Android Lollipop, and as a spokesperson for Sony told us: "Why mess with it?"

While elements such as the notification bar and recent apps look the same as a Nexus phone, Sony does add its floating widgets, wallpapers and some stylish widgets, which we're all for. You can also customise the quick settings which is a welcome feature. There are also Sony's good quality apps such as Walkman, Album and PlayStation. We're not, however, so keen on finding third-party apps such as Facebook, Dropbox and AVG, though these can be removed.

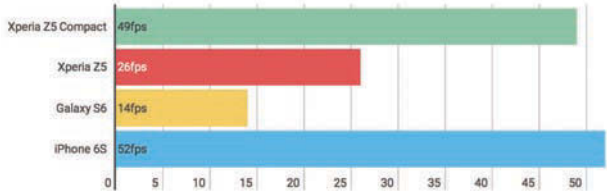
Verdict

The Xperia Z5 Compact is the best small phone around. Those looking for Z5 design and specs in a smaller frame will be pleased. The fingerprint scanner is a great addition and the Snapdragon 810, with almost stock Android, provides slick performance. However, the camera isn't as good as Sony makes it out to be. ☒ **Chris Martin**

Geekbench 3



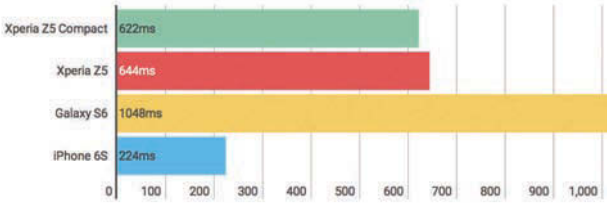
GFXBench Manhattan



GFXBench T-Rex



SunSpider*



* lower is better



SMARTPHONE

Honor 7

£549 inc VAT

Contact
■ hihonor.com/en

Specifications
5.2in IPS display (1080x1920, 424 ppi); Android 5.0 Lollipop; Octa-core Kirin 935 CPU (4x 2.2GHz Cortex-A53 and 4x 1.5GHz Cortex-A53); Mali-T628 MP4 GPU; 3GB RAM; 16/64GB internal storage; microSD card slot (up to 128GB); 20Mp rear camera, AF with dual-tone LED Flash; 8Mp front camera with LED flash; video recording at up to 1080p; fingerprint scanner; dual-band Wi-Fi 802.11a/b/g/n/ac; Bluetooth 4.1 LE; NFC; IR blaster; A-GPS; Micro-USB 2.0; 4G LTE (Cat 6); Nano-SIM; 11.5Wh (3100mAh) non-removable battery; 72x143x8.5mm; 157g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★★



Honor, the brand backed by Huawei, has impressed us with its flagship smartphones at low prices, so we had high hopes for this handset.

Design

Although the Honor 7 looks similar to its predecessor, it actually looks more like the Huawei Mate S (page 44) – thanks to its metal rear cover.

It's a bit bigger than the Honor 6 though, so you'll need to bear this in mind if you're thinking of upgrading. It's by no means the most svelte 5.2in phone on the market, and it's more the 157g weight than the 8.5mm thickness that bothers us.

The front of this handset has a plain appearance – all the styling is found on the rear. The metal body looks like phones that cost twice the price, although we couldn't tell it has a ceramic blasted finish. Strips at the top and bottom have a crosshatch texture, while a shiny bevelled edge all the way around finishes things off nicely.

You may have noticed that a recessed fingerprint scanner sits below the camera and there's an additional button on the left side. We'll come to the fingerprint scanner in the hardware section, but that so-called 'smart button' can be customised to do what you want, such as open an app.

Hardware

The Honor 7 has a 5.2in screen, which is a small increase from the 5in display found on the Honor 6. The resolution remains at Full HD (1080x1920) though, so pixel density takes a small dive to 424ppi. That said, the IPS screen looks nice and crisp, with colours that pop and decent brightness available.

Under the shiny exterior is a bump to a Kirin 935 processor, which is still octa-core, with the same Mali-T628 GPU, though clock speeds are higher with half at 2.2GHz and the other half at 1.5GHz. A healthy 3GB of RAM is on offer and we've found performance of the Honor 7 to be delightfully smooth.

The benchmark results (see opposite) don't entirely reflect this, namely in the graphics department, but we've not had any problems from a user perspective.

Where the Honor 7 really stood out under testing was battery life thanks to the 3100mAh battery. In our benchmark, the phone lasted an impressive seven hours eight minutes, with a score of 4238. That's the best results we've seen from a phone, seven outpacing Samsung's Galaxy S6 models, which last just under seven hours.

In terms of storage, you can choose either 16- or 64GB of internal capacity, while a microSD card slot allows up to 128GB more.

Core connectivity consists of dual-band 11ac Wi-Fi, Bluetooth 4.1 LE, GPS, NFC and 4G LTE support. The IR blaster also remains in the line-up and you get a fingerprint scanner on top. You can use this to unlock the phone with multiple fingerprints, though it can do a lot more. Like a touchpad on a laptop, you can use it for navigational purposes, such as opening the notification bar and recent apps. It can also take you to the homescreen, take a photo, answer a call and stop an alarm. If any of this is annoying – we found it easy to do things by mistake – you can switch these functions off.

We love the different lockscreen photo every time you press the power button and being able to set the extra 'smart button' to do whatever you want



Before we talk about software, there are the all-important cameras to cover. Both have been upgraded compared to the Honor 6 jumping from 16- to 20Mp at the back at 5- to 8Mp at the front.

The main camera now has phase detection autofocus and shoots very quickly, which is always welcome. There's plenty of detail on offer from the Sony sensor and we like the bokeh effect, which gives the impression of a DSLR with out-of-focus backgrounds. The front camera isn't as detailed as 8Mp suggest, but it's better than a lot of phones and the new LED flash will come in handy for dark situations like when you want to take a selfie in a pub or at a gig.

Software

The Honor 7 comes preinstalled with Android 5.0 Lollipop, which is a little out of date now that 6.0 Marshmallow has started rolling out. We're not sure when an upgrade will arrive, but it should get the OS since the phone is quite new.

As usual, there is the Huawei has placed its Emotion UI skin over the top and the Honor 7 comes with version 3.1. As we've found with previous phones running the overlay, there are pros and cons.

We love the different lockscreen photo every time you press the power button and being able to set the extra 'smart button' to do whatever you want. There are also quick settings such as music control.

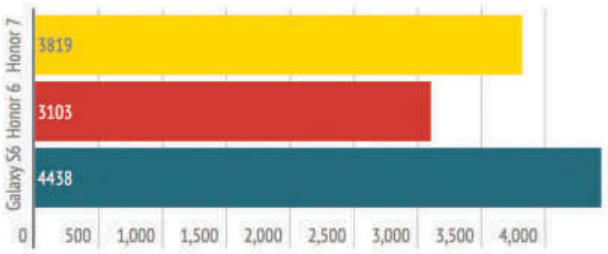
However, we don't like the grid view recent apps, which is awkward to use, and we just don't understand why there is no app menu. This leaves icons all over the homescreen panels as with iOS.

Preloaded apps consist of more than just Google's collection, which includes Maps and Gmail. You also get Facebook and Twitter, which we imagine you would download anyway, and games such as Dragon Mania and Puzzle Pets. You can uninstall anything you don't want.

Verdict

Honor has once again impressed us with a flagship smartphone at an outrageous price. For under £250, you get a lot of phone for your money. Performance is good, with the main camera and fingerprint sensors being the highlights on the hardware side. The Emotion UI isn't our favourite Android skin, but it's perfectly usable and you can always change it if you like. ☒ **Chris Martin**

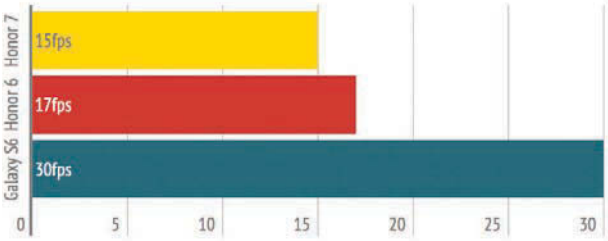
Geekbench 3



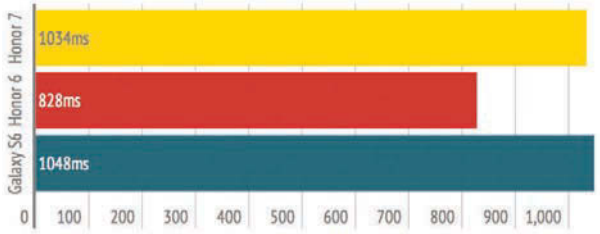
GFXBench Manhattan



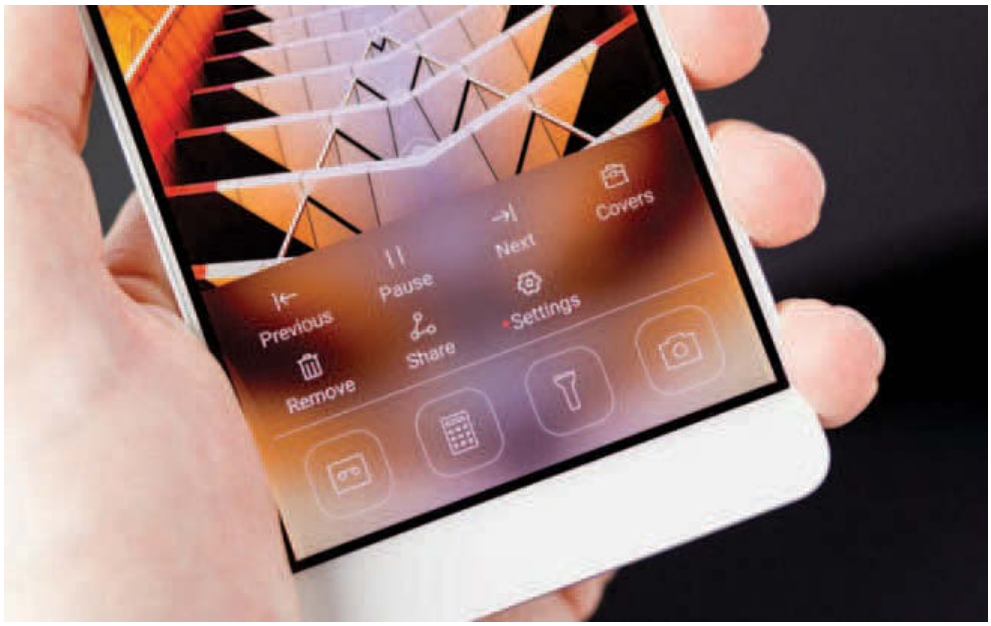
GFXBench T-Rex



SunSpider*



* lower is better



SMARTPHONE

Vodafone Smart Speed 6

£50 inc VAT

Contact
■ vodafone.co.uk

Specifications
4.5in IPS (480x854) display; Android Lollipop 5.1; Quad-core 1GHz Mediatek MT6735M CPU; Mali-T720 GPU; 1GB of RAM; 8GB of storage, can be extended by up to 32GB; 5Mp rear facing camera; 2Mp front facing camera; 720p HD video; non-removable 1780Ah battery; Bluetooth 4.0; Wi-Fi 802.11 b/g/n; GPS; 132.2x65.1x10mm; 146g

Build:
Features:
Performance:
Value:

The Vodafone Smart Speed 6 is the little brother to the Smart Ultra 6 and Smart Prime 6, two of our favourite budget smartphones on the market at the moment – they are first and third in our best budget smartphone charts on page 130. With these two previous handsets surprising us in terms of value for money, we were expecting great things from the Smart Speed 6.



Design

The Vodafone Smart Speed 6 is a budget smartphone, so you can't expect it to be as sleek as, for example, the Samsung Galaxy S6 or the LG G4, but it can still hold its own against other budget smartphones on the market. It has a plastic body that feels cheap in the hand, but when you consider it costs only £50, you can let it slide. It's available in two colours – silver or 'anthracite' (dark grey).

It's a bulky smartphone. However, even though it feels weighty at 146g, it's 9g lighter than the Smart Prime 6, which weighs 155g. Even with its weight, the Smart Speed 6 is comfortable to hold for long periods of time due to its curved rear, which helps it fit snugly into your hand.

It measures 132.2x65.1x10mm and houses a 4.5in display, which gives the Smart Speed 6 a 64.8 percent screen-to-body ratio. The bezels are thick around the edges of the screen, but again, for only £50 you can't expect an edge-to-edge display. The advantage to having a sub 5in display is that it'll feel comfortable to use one-handed, as we were able to reach from one side of the display to the other with ease.

Hardware and performance

As we've touched on, the Smart Speed 6 has a 4.5in IPS display, although we can't describe it as HD as it has a resolution of 480x854, which equates to around 218 pixels per inch. It's not the brightest of screens either, and we had trouble using it in direct sunlight, particularly when trying to read text. That may have something to do with the low resolution, as text isn't as sharp and easy to read as it is on other devices. Even the Smart Prime 6, which costs only £30 more, has a larger, 720p HD display.

Inside is a quad-core 1GHz Mediatek MT6735M CPU coupled with a Mali-T720 GPU and 1GB of RAM. By itself this isn't impressive, but coupled with a low resolution display it performs well. In fact, when we ran our GFXBench tests, we found that the Smart Speed 6 beat the Smart Prime 6, which comes with a 1.2GHz Snapdragon 410 processor. In T-Rex, the Smart Speed 6 managed to get 11fps, compared to the 9.4fps offering of the Smart Prime 6 and in Manhattan, it hit 5.5fps compared to 3.8fps. When we ran Geekbench 3, it was a different story as it relies solely on the CPU and not graphical power. In single-core mode, the Smart Speed 6 scored 457 and in multi-core mode, we recorded 1258. To put this into some perspective, the Smart Prime 6 managed 464 in single-core mode and 1401 in multi-core mode. It's not much of a surprise though, as we experienced intermittent lag when using the device, even when swiping between the home screen menus. While the Smart Speed 6 will suffice for standard web browsing, calling and texting, we wouldn't hold our breath with regards to gaming.

Storage wise, there's only an 8GB option available, and discounting the Android OS and Vodafone apps, you've only got around 4.7GB to play with, which isn't much. Thankfully, the Smart Speed 6 also features a microSD card slot, which can boost your internal memory by up to 32GB. It's worth noting that the Smart Prime 6 also features a microSD Card slot, though it supports up to 64GB of external storage.



> It's not the brightest of screens either, and we had trouble using it in direct sunlight, particularly when trying to read text





Android users like to have access to their device's battery, mainly for the convenience of being able to swap out a dead battery for a full one when needed. Unfortunately, the Smart Speed 6's 1780mAh battery can't be accessed – a theme that's repeated on other Vodafone devices.

Connectivity

One of the Smart Speed 6's major selling points is its 4G connectivity, which brings the 4G network to people on a tight budget. There's also Bluetooth 4.0, Wi-Fi 802.11 b/g/n, GPS and an FM Radio. Thanks to the superfast 4G connectivity, you can also use the Smart Speed 6 as a hotspot to bring internet connectivity to other devices.

Cameras

The Smart Speed 6 has a 5Mp rear-facing camera, with a maximum resolution of 2592x1944 and an LED flash. Various shooting modes are available, including auto, manual, sport, HDR and manual, although we were pretty disappointed with the overall quality of the images taken by the camera. The lack of autofocus means that photos lack of detail, and we were a tad disappointed with the results, especially when you consider the Smart Prime 6 has a decent 8Mp rear-facing camera.

As you can see in the above examples, photos are over-exposed and overall offer the results are disappointing. It's almost as though they have been airbrushed – we can't make out a single brick from the photo of the St. Pancras hotel.

As well as a rear-facing camera, the Smart Speed 6 has a basic front-facing snapper. When we found out it was just 2Mp we weren't expecting a lot from it, though when it came to selfies, the camera performs well. The facial recognition comes in handy as you can't tap the screen to focus on yourself. As long as the phone recognises your face and focuses on you, you should get a selfie good enough for the likes of Instagram and Snapchat.

With regards to video recording, both the front- and rear-facing cameras have the ability to film in 720p HD. There's also image stabilisation, which can be toggled on in the Settings menu. Note this is digital image rather than optical image stabilisation, so the effects aren't as prominent.

Various shooting modes available, although we were disappointed with the overall quality of the images taken by the camera

Software

In terms of software, the Smart Speed 6 has a vanilla implementation of Android 5.1, with eight Vodafone branded apps: Message+, Call+, Direct Access, My Web, Smart Tips, Updates, Vodafone Store and My Vodafone. The Vodafone Store acts as a hub for your phone and is where you can access your data allowance, minutes, texts, and so on.

Message+ and Call+ are interesting additions specific to Vodafone-branded handsets, and bring more functionality to standard phone calls and texts. For example, you're able to mark a call as important to let the recipient know it's urgent, or type the subject/reason for the call. You can even add your location, include a video or completely switch to a video call mid phone call. Similarly, Message+ lets you share your location, contacts, create group chats and even customise the design of the app.

Verdict

Overall, we're disappointed with the Smart Speed 6. The camera lacks basic features that other budget smartphones have (autofocus) and its low resolution display is off-putting. Yes, it's only £50, but the Smart Prime 6 is just £30 more and is far better. It has a larger, 720p HD display, a faster processor, the microSD card slot handles up to 64GB, it has a higher resolution camera, its thinner and looks more premium than the Smart Speed 6. When you consider all the above, we think it'd be worth saving up a little more money to get a phone you'll be happier with. If you can afford it, we'd recommend the Smart Ultra 6 (£125). ☒ **Lewis Painter**

SMARTPHONE

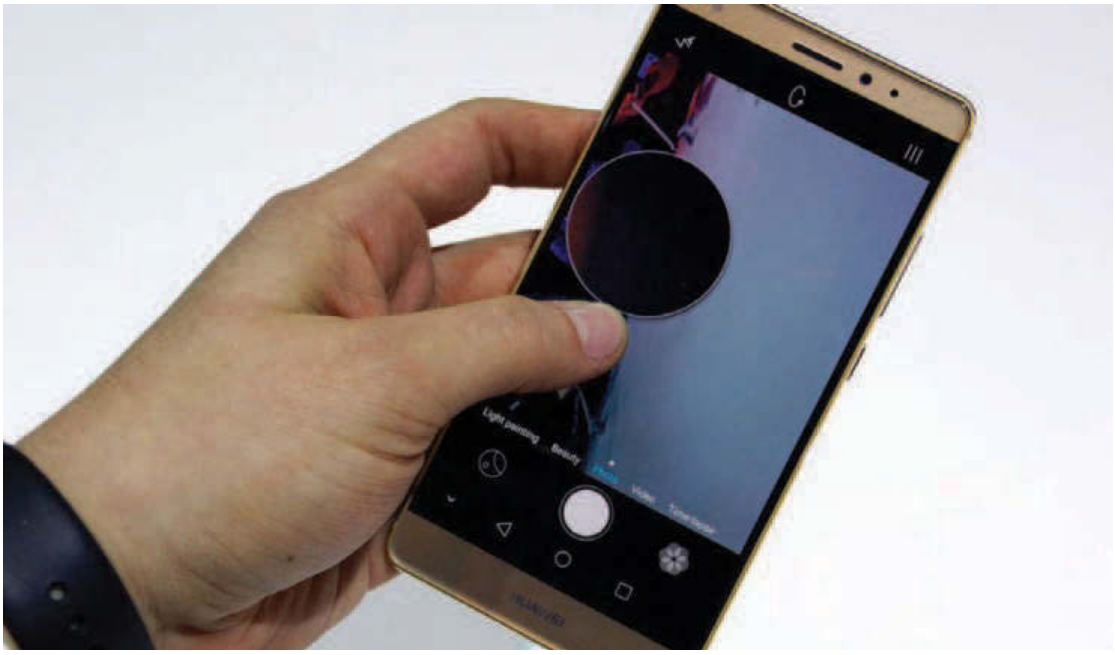
Huawei Mate S

£469 inc VAT

Contact
■ huawei.com

Specifications
5.5in AMOLED display; Android 5.1.1 with EMUI3.1; Hisilicon Kirin 935; MALI 628 MP4; 3GB RAM; 32/64GB memory; front-facing 8Mp camera with LED soft light; rear-facing 13Mp camera with optical image stabilisation, four colour sensor and dual colour-temp LED flash; dual-sim with 4G connectivity; microSD card slot if second SIM not in use; 2700mAh non-removable battery; NFC; Bluetooth; Wi-Fi; 149.9x75.3x7.2mm; 156g

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★½☆
Value: ★★★½☆



Huawei has announced its latest smartphone: the Huawei Mate S. It looks gorgeous, and offers some pretty interesting features.

Design

Huawei has concentrated heavily on the design of this handset, which is reflected in its gorgeous metal unibody (dual diamond cut for precision). The phone has a slight curve at the back, which makes using it over long periods of time more comfortable.

Dimensions wise, the Mate S is just 2.65mm at its thinnest point, widening to 7.2mm at the thickest point of the device. It comes in at 149.9x75.3mm, which is surprisingly smaller than the dimensions of the iPhone 6s Plus (158.2x77.9x7.3mm). Why is this surprising? Because the S Mate has the same size display as the iPhone 6s Plus (5.5in), but is smaller, and in our opinion, a lot more comfortable to hold and use.

Huawei wanted to minimise the presence of antenna lines with the Mate S, an issue that all unibody phone manufacturers (including Apple) have to deal with. The antenna lines are the plastic strips that run across the back of many phones including the iPhone 6s, HTC One M9 and Huawei's own P8. While it's not currently possible to completely remove these antenna strips as these allow signals to be sent and received by the phone, Huawei has tried its best to minimise their presence.

How? Huawei has designed the Mate S in such a way that it doesn't require as many antenna strips as other leading smartphones, and the company has managed to make them thinner too, 1.5mm compared to the iPhone 6's 2mm strips.

Display

The Mate S has a full 1080p HD 5.5in display that looks crisp, clear and bright thanks to a high contrast ratio. It has a pixel density of 401ppi. The Huawei comes with Corning's 2.5D Gorilla Glass 4 to protect the display.

The 64GB variations offer Force Touch technology, much like that used on the Apple Watch and the iPhone 6s. Its capabilities seem limited at the moment, with Huawei looking for suggestions on how best to implement the technology in future. At present, you can Force Touch a photo to get multi-level photo magnification, plus it can be used to weigh objects by placing them on the screen.

Hardware

Huawei has placed a fingerprint sensor on the back of the device, which the company claims is a lot more convenient than having it on the front of the smartphone. Tapping this will trigger the shutter when taking a selfie, swiping down on the sensor will allow access to the notification center, while swiping from left to right (and vice versa) in the Gallery app will swipe between your various photos and videos.

The Mate S also offers dual-SIM technology, with support for 13 mainstream 4G LTE frequencies that cover Europe, USA and Asia. If you don't want to use two SIMs at once, the second slot can be used buy a microSD card.

Internally, the Mate S has a Hisilicon Kirin 935 octa-core processor (a Huawei-designed chip), coupled with 3GB of RAM. Alongside the Kirin 935 sits the Mali T628 MP4 GPU.

We ran benchmark tests to see just how well the hardware performs compared to its competitors. In Geekbench 3, the Huawei Mate S scored 778 in single-core and 3265 in multi-core mode, which puts it in line processor-wise with the Galaxy Note 4 and Honor 6 Plus.

We use GFXBench to test the graphical power of the phone, and the results were surprising, though for all the wrong reasons. It scored 5.8fps in Manhattan and 11fps in T-Rex, putting it in line with mid-range smartphones such as the Ulefone BeTouch and the Honor 6 Plus. SunSpider wasn't much better. We recorded 1448ms, which may sound impressive until you realise that with regards to SunSpider results a lower the score is better.

Inside is a 2700mAh lithium-polymer step platform battery that Huawei claims can last over one day on a single charge, though our battery test suggested otherwise. We use the Geekbench 3 battery test that keeps the display on until the phone dies. The results showed that the Mate S can last six hours 13 minutes on a single charge, with a score of 3706, which puts it in line with the OnePlus 2. The company claim that fast charging capabilities of the Mate S is 2x faster than the iPhone 6 Plus, and that 10 minutes of fast charging will equate to around two hours of talktime.

Hidden away inside the Huawei Mate S are three microphones, which are used alongside Huawei's smart directional algorithm for directional audio recording, with the aim of cutting out any unwanted background noise. You can set it to automatically detect whom to focus on, or you can move the in-app ring to record in a specific direction. It also has a one to one mode that eliminates side noise and produces 'direct listening' for situations like interviews. Though this sounded like a fascinating concept, the overall quality of the audio was disappointing and it isn't a feature we'll be using very often.

Cameras

On the rear of the Mate S is a 13Mp camera, with a four-colour RGBW sensor, which according to Huawei, will help to capture a more vibrant picture and colourful image. The phone also has 1.2-degree optical image stabilisation, which should combat the shakiness in the videos and images taken on the smartphone. It also features a colour temperature LED flash, which aims to combat the tinge left by the flash that some smartphone users suffer from.

With regards to the front-facing camera, the Mate S has an impressive 8Mp camera. It seems that Huawei has listened to the cries of selfie-lovers and has included a soft lighting flash, which provides a decent level of light without over exposure when taking photos in dark environments. You can also improve your selfies, with smoother skin, brighter eyes and a thinner face.

With regards to video, both the front- and rear-facing cameras support 1080p recording.

Overall, we were impressed by both the forward-and rear-facing cameras, both in terms of quality and capture time. As soon as we hit the shutter button, the photo was taken. The company has also included a number of filters, including an impact mode for high contrast black and white photography, and a deeply tuned black and white filter for a more 'classic' look. While we're not usually fans of using filters, we were pretty keen on these – see below.

Software

The Mate S comes with a Huawei-customised version of Android 5.1.1 Lollipop, which includes some interesting features not available on standard Android devices. The first is the notification centre, which is accessed by swiping down from the top of the screen. As well as being able to access various toggles, you can swipe right to access a timeline view of all your notifications over the past 24 hours.

It also comes with a Power usage 'firewall' that'll highlight any power-intensive apps that are draining your battery. From the menu, you're able to quickly disable the background processes completely, or tweak exactly what the app can do in the background.

The Huawei Mate S also offers an interesting way to interact with your phone – by knocking on it. It includes knuckle touch control 2.0, which can be set up to wake up your phone whenever you tap on it with your knuckle, and you can also use your knuckle to crop photos and take screenshots anywhere in the OS.

Interestingly, you can also use knuckle touch to crop videos – simply double-tap to start the recording, and double tap to stop it. It'll create a new video file with your shorter video instead of directly overwriting the original.

Verdict

The Huawei Mate S is a very promising phone. Its design is beautiful, it's lightweight and it fits perfectly in our hands despite the 5.5in display. The only real letdown is the graphical power, as benchmark results put the Mate S in line with smartphones around £200 cheaper, although we experienced no real lag in our use. ☒ **Lewis Painter**





SMARTPHONE

Ulefone Paris

£88 plus shipping

Contact
■ ulefone.com

Specifications
5in HD (1280x720) IPS screen, Gorilla Glass 3; Android 5.1 Lollipop; 1.3GHz MediaTek MTK6753 octa-core processor; ARM Mali-T720 GPU; 2GB LPDDR3 RAM; 16GB storage; microSD support up to 128GB; 5Mp front camera; 13.2Mp Omnivision OM13850 rear camera with LED flash, supports full-HD video recording; 2.4GHz 802.11b/g/n Wi-Fi; Bluetooth 4.0; GPS, A-GPS, GLONASS; 4G bands 3, 7 and 20; OTG; HotKnot; dual-SIM dual-standby (2x Micro-SIMs), both support 4G; 2250mAh battery; 3.5mm headphone jack; Micro-USB port; comes in Metal Grey or Silk White; 144.5x71.7x8mm; 128g

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★½☆
Value: ★★★★½



It costs less than £100 and comes with dual-SIM 4G LTE connectivity, an octa-core processor and a 5in HD screen – but is this Android phone a good buy? .

UK availability

The Ulefone Paris was sent to us by Coolicool.com, which is currently selling the budget phone on its site for £88.39. Note that this phone is shipped from China, so you may have to pay additional charges for import duty.

Design

For a budget smartphone, the Ulefone Paris has a very slight and inoffensive build. It weighs a tiny 128g, and is just 8mm thick, making it easy to operate in a single hand. Although it looks plastic, the frame is a very lightweight metal, which adds durability, while the 5in fully laminated HD IPS screen is protected with tough Gorilla Glass 3.

With 1280x720 pixels stretched across a 5in panel, the Ulefone Paris has a pixel density of 294ppi, which is a little below that of the 326ppi iPhone 6s. This means, for a sub-£100 phone, the screen is pretty clear.

With IPS screen tech, the viewing angles are good and the colours realistic, although we did find the screen a bit dull even at maximum brightness – you may find that visibility in very bright sunlight is compromised. It's also very prone to fingerprints.

There are just two physical buttons on this phone, a volume rocker and a power switch on the righthand side. The three home, back and options buttons that sit below the screen are capacitive, and with no legends save for a white circle around the home button, you'll need to remember which way around they operate.

As with many Chinese phones, the Micro-USB charging slot is found on the device's top edge. Also here is a 3.5mm headphone jack, while at the bottom you'll find the speaker grille and mic.

The Ulefone's plastic rear is removable. It's flimsy but holds tight to the phone and doesn't flex or creak in normal use. Tucked underneath are dual-SIM and microSD card slots, plus a removable 2250mAh battery. A camera with LED flash sits in the top-right corner, lying almost flush to the phone. Very slight curves at the edges, and also on the screen's 2.5D glass, make the Paris more comfortable to hold in the hand.

Hardware and performance

The Ulefone Paris ships with a 1.3GHz MediaTek MTK6753 octa-core processor, 2GB of LPDDR3 RAM and ARM Mali-T720 graphics. Performance for a budget phone is very good, and in real-life use it shows very little lag – launching the Camera app is probably the slowest thing, which takes just a couple of seconds. Plus, having all your apps on the home screen can speed up finding what you're looking for, provided you don't have too much installed.

Benchmarks should always be taken with a pinch of salt, but our test results are as follows: in Geekbench 3.0 we recorded 2614 points in the multi-core test, making it faster than the Vodafone Smart Ultra 6, which currently sits at the top of our budget phones chart, and not far behind the iPhone 6 and HTC One M8.

In graphics and SunSpider, it lags those phones, but is still more than a match for Vodafone's best budget phone, with 15fps in GFXBench T-Rex (6.2fps in Manhattan) and 1489ms in SunSpider. We also ran AnTuTu, in which the Ulefone Paris recorded 29,796 points. You can compare the Ulefone Paris' performance to all the phones we've recently tested in our article What's the fastest smartphone 2015.

There's 16GB of storage inside, although only 9GB is available to the user. Fortunately there's a microSD card slot, which supports up to 128GB when many budget phones can accommodate only 32GB.

The battery is removable, with 2250mAh capacity. Ulefone says it provides a full working day, and 268



hours on standby. Your mileage will vary depending on your usage, but there's nothing here that will place an excessive drain on the battery.

Connectivity and extras

One of the great things about the Ulefone Paris is that it's a dual-SIM phone, accepting two Micro-SIM cards. Dual-SIM functionality is becoming increasingly popular in the UK, allowing you to separate work and pleasure, or even just so you can insert a cheaper local SIM during trips abroad. Both the SIM slots on the Paris support 4G (and all three UK 4G LTE bands are covered), but only one can be configured to use data at a time – this phone operates in dual-standby mode.

There are few other extras, as you might expect from a budget phone. It supports 802.11b/g/n Wi-Fi, Bluetooth 4.0, GPS and GLONASS and USB OTG. Although there's no NFC, there is support for HotKnot, which is a MediaTek equivalent popular in China.

Cameras

The Ulefone's primary camera is a 13Mp Omnivision model that unlike many of the 13Mp cameras fitted to Chinese phones appears to achieve this without software. It has a large f/1.8 aperture and a dual-LED flash, and supports full-HD video recording. Smart gestures are also supported, letting you take a photo by swiping your finger over the front camera or taking a photo only when your subject is smiling.

It talks the talk, certainly, but in our tests we weren't overly impressed with the camera on the Ulefone Paris. Our test shot with HDR is on the right, and as well as appearing a little washed out there is notable banding across the top half of the image. Still, for a budget phone it's not so bad.

For selfies, you also get a 5Mp Omnivision camera at the front of the Ulefone Paris.

Software

The Ulefone Paris is sold with Android 5.1 Lollipop, but with custom U Launcher software that makes some notable changes to the UI. As we mentioned in the introduction to this review, the result is an Android phone with some very iPhone-like software, whereby the app tray is removed and all your app shortcuts are placed on the home screen. It's a messy approach that we're not especially keen on, but it's easy enough to organise apps into folders and some users will find it faster to seek out the apps they need.

The icons are also iPhone-like, shown as squares with rounded corners. Four themes are available for altering the look of these icons, and you switch between them by tapping the Change Skin button on the home screen. You can also tap the Theme button to download extra themes and wallpapers, then set them as the default with a tap.

One addition we do like is the gallery timeline shown on the final home screen, pictured opposite. It's an attractive way or displaying your photos, and it makes quickly finding them by date much easier.

Other deviations from stock Android include some smart gestures. In the Settings menu, you'll find an option to turn on three-finger screenshots (you swipe up or down with three fingers to take a screen grab), plus a handful of options that are mainly to do with making, receiving and muting phone calls and taking photos.

Verdict

The Ulefone Paris is a great budget buy at £88, but bear in mind that you may also need to factor in import duty. Even so, it's a great rival to the £125 Vodafone Smart Ultra 6, which sits at the top of our budget smartphone chart (page 130), with faster core hardware and 4G dual-SIM functionality, but a lower-resolution screen. The camera isn't as impressive as the rest of this budget phone's spec, but it's still acceptable for such a cheap device. ☒ **Marie Brewis**



SMARTPHONE

UMI Hammer S

£108 plus shipping

Contact
■ umihammers.com

Specifications
5.5in HD (1280x720) IPS display, 2.5D curved glass; Android 5.1 Lollipop with UMI Rootjoy; 1GHz MediaTek MTK6735 quad-core processor; ARM Mali-T720 graphics; 2GB RAM; 16GB storage; microSD support up to 64GB; 8Mp Sony IMX179 rear camera (software to get to 13Mp), six precision lenses, f/2.0 aperture, dual-LED flash; 3.2Mp front camera, f/2.2 aperture, 1.12µm pixels; dual-SIM dual-standby (2x micro-SIM); supports all three UK 4G bands; dual-band 802.11b/g/n Wi-Fi; Bluetooth 4.0; HotKnot; GPS; OTG; IR blaster; Touch ID fingerprint scanner; USB-C; 3200mAh battery; 154x77.4x8.5mm; 200g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★☆☆
Value: ★★★★½



The Hammer S is a larger phablet version of the UMI Hammer, the wallet-friendly Chinese phone that was billed as virtually unbreakable. It's not just the size and weight that's changed here, however.

UK availability

We received our review sample of the Hammer S from Coolicool.com. It's available from its Chinese warehouse for £88.39, or the European warehouse for £108.79. It's up to you which outlet you choose to use, but if you take the cheaper option you could end up paying more if your parcel is picked up by Customs (no charges are applicable when shipped within Europe). Read our advice on buying grey-market tech before you make that decision.

Design

For a cheap phone, the Hammer S has a really nice design. Ours came in white, but the UMI is also available in black. It's larger and heavier than the original Hammer, but its 8.5mm design and 200g is not too extreme for a phablet, and the slightly curved edges both on the rear and the 2.5D glass on top make it easier to handle.

The frame is built from aviation-grade aluminium, and it feels not only tough but premium. Along its top edge you'll find a 3.5mm headphone jack and IR blaster, and at the bottom a USB-C charging- and data-transfer port and a single speaker – pleasingly this has been moved from its palm-muffling rear position on the UMI Hammer. On the righthand side is a power button and volume rocker.

Turn over the Hammer S and a camera juts out a small amount from the case, sat to the left of a dual-LED flash and just above a rear-mounted fingerprint scanner, which falls naturally under your forefinger when handling the phone. This cover is plastic and removable, but not flimsy or creaky, giving access to an also-removable 3200mAh battery, dual micro-SIM slots and a microSD card slot.

The 2.5D curved glass at the front adds a touch of flair and protects the edges of the screen from chips. It doesn't lie entirely flush, however, and running your fingers over the edge you'll feel the lip of the metal frame. Don't do that too much, though, because the Hammer S is rather good at attracting fingerprints.

The screen itself is a large 5.5in HD panel, which means it's usefully large for reading text or watching videos. (It's not so hot on gaming, as we'll come to later, but casual gaming should be fine.)

An IPS panel with a 1280x720-pixel resolution, the Hammer S is bright, responsive, and has excellent viewing angles and very realistic colours. Pictures and video look good, but despite the HD resolution the large screen area means you can pick out some fuzziness around the edges of text and icons – the UMI has a pixel density of 267ppi.

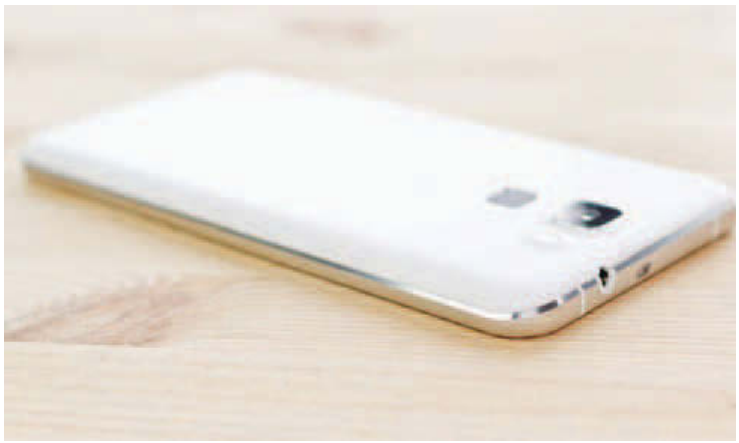
Hardware and performance

The Hammer S is not the fastest phone you'll find at this price, but in real-world use we think few users would think it slow. We never found it to take more than a second to launch an app, and there are various smart gestures that make it even quicker to access what you need from standby. Lag is minimal, too, at least in its out-of-box, almost-vanilla-Android state.

But benchmarking is what we do at *PC Advisor*, so benchmarking we did. None of the results raised an eyebrow for any of the right reasons, but neither would we expect them to do so at this price.

In AnTuTu we recorded a lowly 20,237 points, and just 1391 points in the multi-core component of Geekbench 3.0. Performance in SunSpider was up there (or rather down there) with Android phones of the past, measuring a slow 2095ms in Chrome. Graphics weren't any better: in GFXBench (onscreen) the Hammer S turned in 8.5fps in T-Rex and 3.5fps in Manhattan.

Given its budget price, the Hammer S' storage and battery specifications are more attractive. There is 16GB of storage built into



this phone – twice what you'll find from many of its rivals – plus support for microSD up to 64GB.

And while many people have reported battery life problems with the 2250mAh battery inside the UMI Hammer, the Hammer S is fitted with a higher-capacity 3200mAh battery. UMI says you can expect 300 hours on standby, 17.5 hours of music playback, or 11 hours of internet browsing over 4G.

Connectivity

And that leads us on to our next point. One of the problems with importing phones from abroad is that they are not always compatible with UK 4G networks. But the UMI Hammer S supports all three 4G LTE bands used in the UK – 3, 7 and 20 – and does so with support for dual SIMs (dual-standby).

There's an IR blaster for controlling compatible devices within your home, and the fingerprint scanner on the phone's rear is a pleasing addition given that it recognises touch- rather than swipe-based input – it's much easier to use, and even lets you set biometric security for individual apps rather than the entire phone.

The reversible USB-C port is another welcome addition, and now that support for the standard is built into the latest version of Android we'll see an increasing number of phones, tablets and accessories adopting Type-C USB. The Hammer S supports dual-band 802.11b/g/n Wi-Fi, Bluetooth 4.0, GPS and USB OTG. Rather than NFC it offers HotKnot, which seems to be pretty standard for Chinese phones.

Cameras

UMI says the Hammer S has a 13Mp camera, but it's actually an 8Mp Sony IMX179 that uses software to boost to 13Mp. It has six precision lenses, an f/2.0 aperture and a dual-LED flash. The Camera app supports the usual modes, covering everything from HDR to Beauty mode, motion-tracking mode, panorama and multi-angle view.

By default, images are shot at 13Mp in 4:3 format, and if you wish to shoot in 16:9 the max available is 9.5Mp. The results aren't bad – some detail is lost, but we like the vivid colours returned by the UMI. You can see our test shot (captured with HDR on) below.

A 3.2Mp camera with an f/2.2 aperture and 1.12µm pixels is also available at the front of the phone.

Software

The Hammer S is preinstalled with Android 5.1 Lollipop out of the box, although you can also use the Rootjoy application to quickly flash custom ROMs from a PC or laptop.

It's a reasonably plain implementation of Android, and whereas you'd normally expect to find a plethora of Google's own apps all you get here is Google Play. Of course, that means you can download any or all of Google's apps (and any other apps) as you see fit.

That's not to say no apps are preinstalled, of course. There are UMI's own Browser, Camera, File Manager, Messages, Music and Calendar apps, plus the ZaZaRemote and SuperCleaner apps. Of the device's 16GB of built-in storage, just under 12GB is available to you.

One of the tweaks UMI has made is the ability to use smart gestures to wake the phone from standby and instantly launch an app of your choice. A double-tap will wake the screen; drawing down pauses music, and right or left can skip the song; and you can set custom gestures whereby drawing a letter on the front of the screen will wake the phone and launch your chosen app.

Verdict

We like the Hammer S. It's not the fastest phone you'll find at this price, but it's fast enough for daily use. The design is nice, and genuinely useful technology – USB-C and the fingerprint scanner, for example – comes at an attractive price. A strong rival to the Vodafone Smart Ultra 6. ☒ **Marie Brewis**



TABLET

Apple iPad mini 4

£319 inc VAT

Contact
■ apple.com/uk

Specifications
7.9in (2048x1536, 326ppi) LED-backlit IPS LCD, capacitive touchscreen; iOS 9; Apple A8 processor, M8 motion coprocessor; 2GB RAM; 16-/64-/128GB onboard storage; Wi-Fi 802.11 a/b/g/n/ac, dual-band, Wi-Fi hotspot; 8Mp, 1.2Mp cameras; 203.2x134.8x6.1mm, 299g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★½☆

★★★★☆



Perhaps a sign that the mighty iPad's popularity is waning, Apple announced the iPad mini 4 (and iPad Pro) alongside the iPhone 6s and 6s Plus (page 30) rather than hosting a separate event this year. But if you're in the market for a new tablet, the mini 4 has plenty to offer.

Design

Glance at the new 8in tablet and you might not immediately spot the subtle changes in its chassis. But just as Apple made the iPad Air 2 thinner than the original iPad Air, the mini 4 is now 18 percent thinner, a little taller and lighter.

While the old Smart Cover will physically fit, you really need one designed for the mini 4 because the magnets appear to have been repositioned and the old covers don't connect as well.

Specific-fit cases for older iPad minis are unlikely to work with the mini 4 either. Apple hasn't made a Smart Case for the new tablet, but you can pair the new iPhone-style silicone case with a Smart Cover to get all-round protection.

If you missed it on the Air 2, you'll also miss the mute/lock rotation slider on the iPad mini 4, because it's gone. Those settings are now only in the Control Centre which you get to by swiping up from the bottom of the screen.

Display

It still has a 7.9in diagonal and a 2048x1536 resolution, but the screen on the mini 4 is a big upgrade. It's the one we'd hoped for on the mini 3, but at least it's here now. Apple has removed the air gap between the cover glass and LCD, which not only improves the build quality. The tablet feels more solid - but it also improves contrast (a lot) and makes everything look noticeably better.

The screen also gains the anti-glare coating of the Air 2 and while there are still reflections, it makes a noticeable difference and helps to cut down on glare and improve the screen's perceived quality.

Measuring the new display with our Spyder4, we're pleased that the iPad mini finally matches its bigger brother and has – as near as makes no difference – 100 percent sRGB coverage. What that means in the real world is that colours are vibrant instead of a bit muted: put an older iPad mini next to an mini 4 and it's obvious that it has an inferior quality screen. They're also more accurate, so photos and videos will look the same on an iPhone 6 Plus, iPad Air 2 and mini 4.

Performance

Many will think of the mini 4 as a shrunk-down Air 2, but it's not quite as powerful. Instead of the A8X chip, Apple instead furnished the new tablet with an A8 out of the iPhone 6 - or at least a similar version.

Put simply, the mini 4 is not as fast as the Air 2. In Geekbench 3, it managed 1719 (single-core) and 3101 (multi-core). The Air 2 scored 1816 and 4523 respectively, so in some apps, which take advantage of more than one processor core, the Air 2 is considerably faster. Those that don't will run with roughly the same performance. According to Geekbench 3, at least.

Again, in real-world use, the mini 4 zips along and feels every inch the premium tablet. There's a slight hesitation when using two apps at once in the Split View mode, but it's smooth for the most part and we love the iOS 9 picture-in-picture mode where you can watch a video in a small window that sits over another app. What it means is you can browse the web while the news say, plays in the corner.

When it comes to 3D, the Air 2 also strikes out ahead. It







scores 52fps and 25fps in the T-Rex and Manhattan GFXBench tests respectively. The mini 4 can manage only 37- and 15fps.

It's still a lot faster than the iPad mini 2 and 3, which share the same graphics chip, and scored 22fps in T-Rex and 9fps in Manhattan. But if you were hoping for an iPad mini with the power of an Air 2, you could be a tad disappointed.

In better news, the smaller battery in the mini 4 lasts longer than its predecessors. In our initial tests, it lasted roughly an hour longer than the iPad mini 2.

Cameras

Another upgrade is the rear camera. This has made the leap from 5Mp to 8Mp, and by all accounts is the same camera as the iPad Air 2's. It's not half bad, either, if you're taking photos in good light. And with the iPad mini, you don't look as strange holding a tablet up to snap videos or photos.

The jump to 8Mp is only part of the story. There are multiple benefits of the extra processing power from the A8. First, it means you have the extra luxuries of burst photos and slo-mo video (120fps at 720p). Hold the button and photos are taken at a blistering 10 per second. And while slo-mo isn't as slow as the 240fps available on the iPhone 6 and later, it's still a nice feature to have. What you don't get is the option of shooting 1080p video at 60fps, but 30fps is enough for most people.

Panoramas are captured at up to 43Mp – the same as the iPhone 6 and 6 Plus. Stitching is seamless and dynamic range is good, too, making this a feature you're likely to use more than once. Autofocus is quick, and face detection is better than before, so you're less likely to end up with photos where people are blurry and the hedge in the background is nice and sharp.

As you'd expect, video looks good. Colours are accurate, sound is clear and details are sharp. Software stabilisation is quite effective, too. Things only start going downhill in low light, with noise creeping in to photos as well as videos. But even then, it's hard to think of a tablet that does a better job.

The two photos above have only been resized to 1600x1200 pixels, down from 3264x2448:

The front camera has a 1.2Mp sensor – again the same as the iPad Air 2. Its larger aperture (than the iPad mini 2) lets in more light, although the increase in quality is not always obvious. Maybe next year we'll see a proper upgrade to the FaceTime camera.

Price, storage and colours

When buying an iPad, you have a choice of space grey, silver or gold. No change there, but the fact that nothing has moved on the storage front is more of an annoyance. The base 16GB model is even more inadequate in 2015, especially with the higher-quality camera.

The 32GB option disappeared with the iPad mini 3, so you have to choose between 64- or 128GB versions. As ever, there's also a Wi-Fi + Cellular option in all three storage capacities which costs £100 more (and also adds a GPS receiver as well as 4G LTE). So, you'll pay a minimum of £319, and a maximum of £579. Our pick, though, is the 64GB Wi-Fi only model which costs £399.

And before we get into the 'year-old innards argument', don't forget that these are the same prices Apple charged a year ago for the highly inferior iPad mini 3. Yes, you can buy a 16GB iPad Air 2 for £399, but we'd rather have the smaller mini 4 and 64GB for the same price. Despite the shortfall in performance.

The tablet also gets the upgraded Wi-Fi first seen in the Air 2 - 802.11ac which can run (theoretically) up to 866Mb/s. There's also Bluetooth 4.2 and thanks to Touch ID you can use Apple Pay to pay for things in certain apps. Plus it comes with iOS 9, which is superb and a major reason to choose an iPad over any other tablet. It adds loads of useful features and tweaks compared to iOS 8, and the app store is the best stocked of all its competitors

Verdict

There are cheaper tablets – cheaper iPads even – but if you can afford to buy the iPad mini 4 you won't be disappointed. It finally has a great screen, and while it can't match the more powerful iPad Air 2, it's got more than enough poke to satisfy demanding users. The rear camera is decent and a big step up from many cheaper tablets. With great build quality and battery life on top, it's hard to fault the new mini so unless you want to wait to see if Apple launches an iPad Air 3, or you want the Air 2's bigger screen, it's a good buy. ☒ **Jim Martin**

TABLET

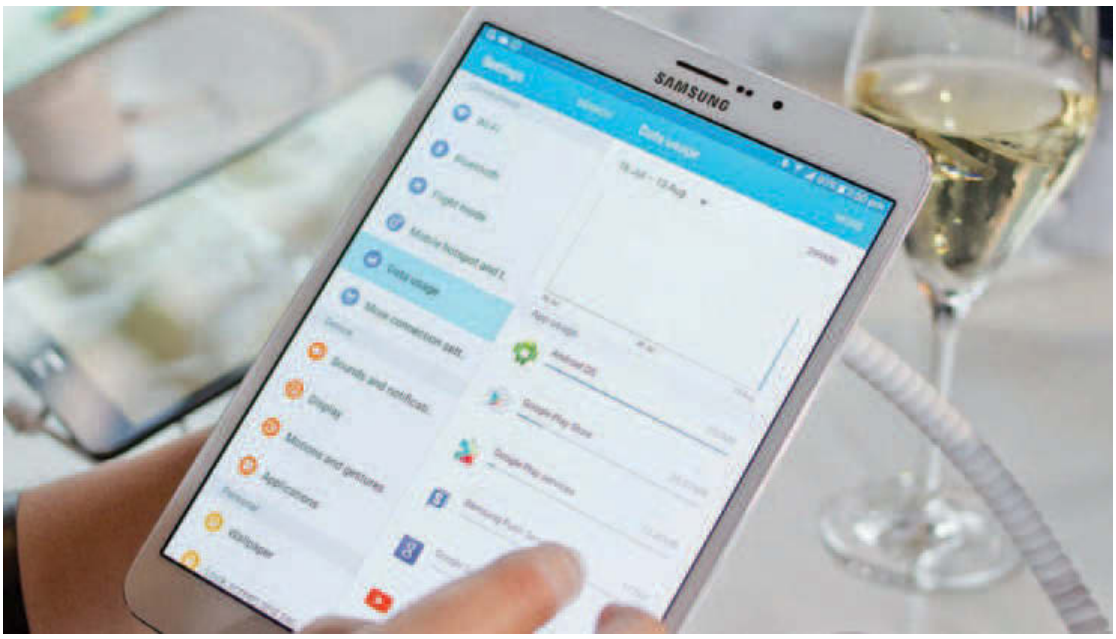
Samsung Galaxy Tab S2 8

£319 inc VAT

Contact
■ samsung.com/uk

Specifications
Android 5.0 Lollipop; Exynos 5433 (quad-core 1.9GHz Cortex A57, quad-core 1.3GHz Cortex A53); Mali T760MP6; 3GB RAM LPDDR3; 32/64GB internal storage; microSD (up to 128GB); 8Mp rear, 2.1Mp front cameras; 11ac Wi-Fi; Bluetooth 4.1; GNSS; Micro-USB, optional LTE; 135x199x5.6mm, 265g

Build:
Features:
Performance:
Value:



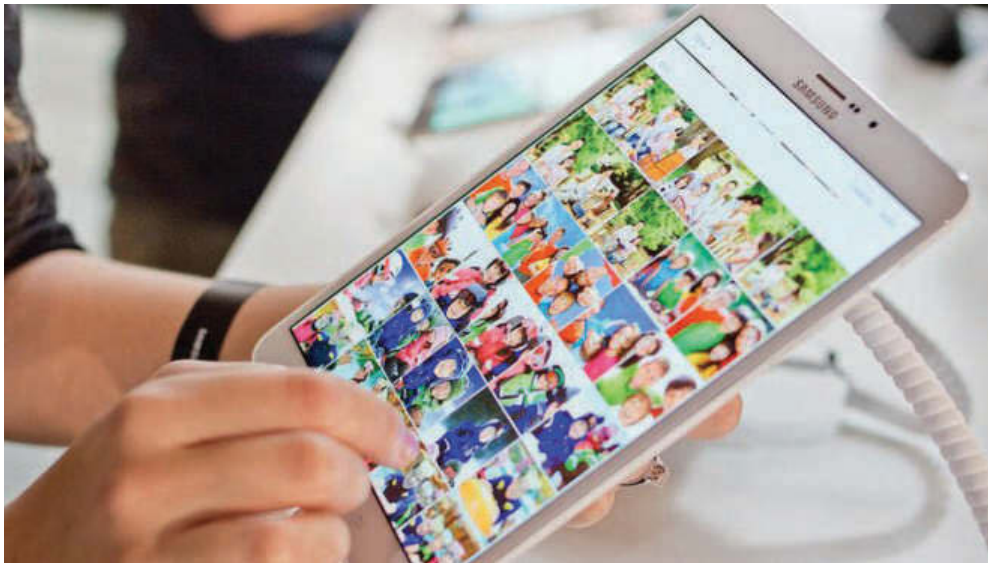
The Samsung Galaxy Tab S2 models are the successors to 2014's original Galaxy Tab S range, which featured the S 8.4 and the S 10.5. We thought they were the firm's best tablets, so we had been looking forward to the arrival of the second generation. We're pleased to say that they don't disappoint.

Design

There are two sizes of the Galaxy Tab S2 available, in a similar move to Apple's iPad range. Here, we're talking about the smaller 8in model, but there's also a 9.7in option if you want a larger tablet. If you're an Apple fan, those sizes might sound familiar, as the iPad mini 4 is 7.9in, while the iPad Air 2 is 9.7in.

We'll talk a bit more about the screen in a moment, but first let's explore the design and build of the Galaxy Tab S2 8, which is a delight to hold and felt on par with the iPad mini (page 50) in terms of quality and comfort. It's just 5.6mm thick, which is a whole millimetre thinner than its predecessor, and also thinner than the 6.1mm mini 4 and lighter, too. It weighs only weighs 265g – Apple's tablet weighs 299g.

Our review unit of the Tab S2 8 was white, but we've also spent some time with the black model, both of which are gorgeous. The back of the tablet is made with plastic, though it manages to look more premium thanks to the metal edges and completely glass front.



Display

The screen sizes of the two Tab S models are smaller than their predecessors, a move that's opposite to the way smartphones are heading where bigger seems to be better. With the decrease in size comes a reduction in pixels, as can be expected. Both have the same resolution, though, down from 2560x1600 to 2048x1536. For the 8in model, that means a pixel density of 320ppi.

That display is Super AMOLED, as can be expected from Samsung, and the company has said that they deliver 94 percent of the Adobe RGB standard. There are also two display features to make it look even better: Adaptive Display, which can automatically adjust gamma, saturation and sharpness; and Reading Mode for the perfect brightness for your eyes.

The screen is stunningly good – it's bright and crisp, and the colours pop, making a great experience if you plan on using your Tab S2 for watching videos and playing games.

Hardware

Inside the Tab S2 8 is an Exynos 5433 Octa-core processor and Mali T760MP6 for graphics, as well as 3GB RAM, which makes for a smooth and speedy little tablet. We didn't experience any lag, even when playing graphics-intensive games and switching between apps.

In our benchmark tests, the

The screen is stunningly good – it's bright and crisp, and the colours pop, making a great experience if you plan on watching videos

Galaxy Tab S2 managed some impressive results, scoring a whopping 4305 in the Geekbench 3 processor test and therefore blowing the iPad mini 4's 3101 out of the water. Indeed, it was much closer to the 4523 scored by the iPad Air 2.

When it comes to graphics, the Galaxy Tab S2 couldn't match the iPad mini 4's performance, but it came close. It managed 26fps on the T-Rex GFXBench test and 11fps, in the Manhattan test. The iPad mini 4 scored 37fps in T-Rex and 15fps in Manhattan.

Internal storage is 32- or 64GB, and there's a microSD card slot, allowing you to add up to 128GB more space, so you won't be running out of room for more videos, photos or apps any time soon. When it comes to connectivity, you'll find 802.11ac Wi-Fi, Bluetooth 4.1, GNSS and optional 4G LTE, so all of the connectivity features you'd expect from a flagship tablet these days, which we're pleased to see. There's also a fingerprint sensor, which has been improved since the previous generation to match the Galaxy S6 phones. This replaces the old swipe requirement with a much easier-to-use touch mechanism that's similar to the Touch ID fingerprint sensor found on the latest iPads.

Cameras

The cameras on the Galaxy Tab S2 8 are good for a tablet, but not great when you compare them with the cameras you'll find on flagship smartphones. We don't, however, know many people who take lots of photos using their table, so we're not disappointed. The front-facing camera is 2.1Mp, while the rear-facing offering is 8Mp.

In our tests, we found that pictures were a little grainy and shutter speed isn't great, but you should find the images you're able to capture satisfactory. Plus, you're more likely you'll be using a smartphone or dedicated camera for anything important you want to take a picture of. There are some good modes available, though, including Panorama, HDR, Virtual Shot, Dual Camera and more.

Below are two example photos taken using the Galaxy Tab S2 8's rear camera.

Software

The Tab S2 comes with Android Lollipop 5.0 preinstalled, and we expect to see an Android Marshmallow update in the near future. As a bonus, you get Microsoft Office and 100GB of OneDrive free for two years with your tablet.

Geekbench 3



GFXBench Manhattan



GFXBench T-Rex



Samsung has also added some of its own features to the software, including the Pop-Up Window and Smart Manager features.

Verdict

We've loved the Galaxy Tab S2 since the very first time we got our hands on it back. It's a tablet that's well worth considering if you've been thinking about buying the iPad mini 4. It's almost unbelievably thin and light, and that screen is a joy to use.

Ashleigh Allsopp





TABLET

LeapFrog Epic

£119 inc VAT

Contact
■ leapfrog.com

Specifications
7in (1024x600) capacitive touchscreen; 16GB storage; 1.3GHz processor; 2Mp front and rear cameras (640x480 max video resolution); 3.5mm headphone jack; Micro-USB sync/charge port; 229x162x26mm; 580g; 1-year warranty

Build:
Features:
Performance:
Value:

LeapFrog's latest tablet for kids is called the Epic, which stands for Explore, Play, Imagine, Create. Underneath the branding is a 7in Android tablet that comes with a silicone bumper and a stylus, and some clever software.



Display and hardware

We've seen just about every kids tablet – including the recent LeapPad Platinum – and were immediately disappointed to see a low-quality screen on what is an expensive children's tablet. Instead of IPS – the technology used in Amazon and Tesco tablets – Leapfrog has cut corners and opted for TN. This means viewing angles are very limited and that you have to hold it at the right angle to see colours as they're supposed to look. The low resolution of 1024x600 isn't as good as we'd expect at this price, but our three- and seven-year-old testers didn't seem to mind.

Younger children won't mind the styling, but those a little bit older will want to remove the bumper and maybe unhook the stylus cable to give a sleeker look. Even then, the huge bezels mean it never really looks sleek.

On the rear is a speaker, and this sounds quite good when the tablet is placed on a table top with the bumper attached.

There are front and rear cameras, but both are very poor for photos and videos. Like the screen, we would have been disappointed with these several years ago. In a modern tablet at this price, it's unacceptable.



Battery life is decent enough at six hours or so, and you can recharge using a standard Micro-USB cable. A 1.3GHz processor powers the Epic, but it never feels quick. It's not as sluggish as some of Leapfrog's previous tablets, but nowhere near as zippy as, for example, a Hudl 2.

Software

While the Hudl 2 may seem better value at £99, it's the software that Leapfrog has focused on. As well as a child-safe web browser in which you can add websites you deem appropriate, the whole system is locked down and safe for kids to use on their own.

The home screen is interactive, which our three-year-old tester loved. You can scroll side to side to move between different areas in the city – including the park – and add stickers that move around when you tap them. There are certain interactive elements, such as a weather forecast and a 'word of the day' game. It changes from day- to night mode in real-time and the city changes depending on the child's age. (You can, of course, set up multiple kids' profiles.)

Daily surprises – a present they can tap on – offer fun mini-games such as a story that involves recording your own voice when instructed to say and sing things, which are inserted into the final story. Six app icons reside at the bottom, and you can drag any six apps from the app tray to replace the defaults.

You also get a calendar app, calculator, clock, notepad, voice recorder, music player, gallery for your photos and videos. Plus there are two main games: PetPadParty and Stretchy Monkey. The first time you open the Leapfrog app store, you get a choice of a free app or game. There's plenty of fun to be had with the three preinstalled games, but when your kids get bored with these, you'll be paying for apps from the store. These range from a couple of pounds up to around £20, and include plenty of characters your kids will know, including *Octonauts* and *Frozen*.

While the Epic displays the UK rather than US school system, none of the apps are UK specific. Voiceovers are American and while apps try to be 'region-less' it would be nice to have UK voiceovers.

At the time of writing there was no way to access the underlying Android 4.4 OS and install apps from Google Play, but Leapfrog told us an update was coming in October to allow you to access the Amazon Appstore.

Verdict

The updated software and interactive home screen are welcome, but the hardware is disappointing for the money. You don't get many games included, and there's limited educational value in what's bundled. Amazon's new £99 Kids Edition Fire tablet is arguably a better deal as it has better hardware and a year's subscription to kids' content thrown in. ☒ **Jim Martin**

FREEVIEW BOX

EE TV

£4.95 per month

Contact
■ ee.co.uk

Specifications
Linux OS; 4 HD (high definition) tuners; 1TB hard drive; dual-band Wi-Fi (2.4/5GHz); 1Gb/s ethernet; HDMI; Optical S/PDIF; Latest Broadcom processor (3000 DMIPS); 200x200x38mm

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆
★★★★☆



As well as its mobile phone network and home broadband, EE offers a TV service to rival the likes of YouView. A stylish black box, the EE TV is available from £4.95 per month when you sign up to EE TV and Home Broadband. This jumps to £12.95 per month after six months, plus there's a line rental of £16.40 per month, too. If you're already a customer, then you'll need to sign up to a new 18-month contract.

Since the EE TV is a Freeview box if you have a regular TV aerial, then you get non-subscription access to more 70 regular and 13 HD channels.

Setup is quick and simple, and you can choose to connect the box to the internet via ethernet or Wi-Fi. You'll also need to decide whether to opt for the ability to record four channels simultaneously or a feature called Replay. This allows you to select up to six favourite channels, and the box will record programs on these from the past 24 hours – you can also choose six-, 12 or 18 hours. You can also start watching a show from the beginning if you happen to switch the TV on a little late. We found that this feature worked well and we'd recommend going for the Replay option unless you really need to record more than two channels at once.

The EE TV offers a different approach to YouView, which allows you to watch anything from the previous seven days on the guide, but only if it's available on a catch-up service, and it will simply link you to the right place.

When it comes to catch-up services, the EE TV box can't match YouView on this front and has a narrower choice. You get some decent offerings, such as BBC iPlayer, Demand 5 and Sky Now TV. Others include Deezer, YouTube and Hopster, though that means there are some key omissions, including ITV Player, All 4 and Netflix.

The EE TV's remote is compact, simple, effective and made from a comfortably soft rubber/plastic.

User interface

While there's an EPG (electronic program guide) this isn't the regular screen on the EE TV. Instead, you get a bright and colourful homescreen, which is split up into sections horizontally.

The main screen is Live TV where you get a large section showing you the last viewed channel, plus others round the edge. Other windows display On Demand, Recording and Replay (if you chose that option).

When watching live TV, you can press up or down on the remote to see what else is on other channels. This is displayed at the left side of the screen in a vertical list. Meanwhile, you can see what's on after the show you're watching with left or right. This is displayed along the bottom of the screen.

As you might expect, you can record shows and the whole series. There's plenty of space for recordings with a 1TB drive inside, just bear in mind that the Replay feature uses some space to work.

We found the box and interface nippy and responsive, though the EPG frustratingly loads the grid every time you move around .

One of the key features of the EE TV is the associated app, which you can download on iOS or Android. Connected to the same network at the device, the app finds the box and you're away. You can watch live TV, view recordings and make use of the Replay feature. Being able to see all this content on your phone or tablet is a real boon and means you don't need to worry about having individual apps installed for BBC iPlayer, Channel 5, Now TV, and so on.

Up to four people can stream content to mobile devices at once, which means there should be no, or at least fewer, arguments about what to watch. Each user can also have their own favourite shows and view any recordings they scheduled, so you don't all need to browse the entire library every time.

Verdict

If you're happy to be an EE customer for TV, broadband and phone, the EE TV box is a good deal. However, it lacks some big name on-demand services, which is where YouView beats it. ☒ **Chris Martin**

SMARTWATCH

Garmin Vivoactive

£139 inc VAT

Contact
■ leapfrog.com

Specifications
1.1in (205x148) touchscreen colour display; rechargeable lithium battery; up to 3 weeks battery life (10 hours in GPS mode); 5 ATM water rating; 43.8x38.5x8mm; 38g



Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★½☆
Value: ★★★☆☆

★★★½☆

The Garmin Vivoactive is a sports-oriented smartwatch that has built-in GPS (unlike many smartwatches), which means you don't need to take your phone with you on a run or cycle.

Design

Garmin has opted for a square design for the Vivoactive. We prefer the look of circular smartwatches but wouldn't say that the Vivoactive is unattractive. It's available in either black or white, and is thin at 8mm, though perhaps too large overall for those with dainty wrists.

Its display is 1.13x0.8in, and has a resolution of 205x148 pixels. It's a full colour touchscreen that's been designed with outdoor use in mind. It's readable in sunlight too, which is handy if you want to check your stats while you are on a run.

There are interchangeable bands available for the Vivoactive watch, so you can pick a design that suits your style. With the band included, it weighs 38g.

You'll pay between £139 and £199 depending on the colour and strap design and, of course, where you buy – Amazon is a good bet.



Features

The Vivoactive runs Garmin's own software rather than Android Wear, and has built-in sports and activity-tracking apps. It can track activity and GPS-based data, while the user is walking, but also while running, cycling, golfing, swimming (it's waterproof up to 50m), and more. It has the usual built-in accelerometer and pedometer in addition to compatibility with optional speed trackers and heart-rate monitors, too.

In addition to the fitness features, the Vivoactive can connect to an Android or iOS device to give you haptic and visual notifications, including incoming calls, texts, emails, calendar alerts, social media notifications and more, and of course, it can tell you the time.

You don't need to have your smartphone with you all the time, though. As the GPS feature is built in to the Vivoactive itself, you can go for a run or cycle without taking your smartphone with you, and the Vivoactive will keep tracking your activity.

The Garmin Connect Mobile app will automatically sync with your Vivoactive to give you a post-run summary, which will include calories

In addition to the fitness features, the Vivoactive can connect to an Android or iOS device to give you haptic and visual notifications



burned and distance travelled and will let you know whether you exceeded previous personal records.

Thanks to its water resistance, you can indeed swim with the watch and, once you tell it you're swimming, it will count the number of strokes you make, the time and distance covered. While running, you can see time, distance, pace and calories, plus there's auto pause when you take a break, and auto lap for those circuits around Richmond Park. The Vivoactive doesn't measure heart rate directly, but it's compatible with Garmin's heart-rate chest straps and will display heart rate and zone on the display.

There's even a golfing mode where it will display the hole number, par and distance to the hole (thanks to that built-in GPS), along with your scorecard. You can download course maps from Garmin – there are more than 38,000 of them from all over the world – to enhance your play.

And like Garmin's Vivofit, the Vivoactive will give you move reminders – if you want them – through the day and work like an activity tracker.

The Connect IQ store allows Vivoactive users to customise various aspects of the smartwatch, including watch faces and widgets, and allows the installation of additional apps.

Other features include the ability to control your music and locate your smartphone, as well as a Live Track feature that lets others track you in real-time, and an automatic notification that alerts you if you've been idle for too long.

Performance

Garmin claims the watch has a three-week battery life and 10 hours with GPS active. It alerts you to and provides access to calls, calendar reminders, texts and email through a Bluetooth connection to your main device, in our case an iPhone 5.

As a cycle-tracking device, the Vivoactive falls short of its cousins in the Edge range of cycle computers. It works with Garmin's speed/cadence sensor (and HRM) but these have to be bought separately. Where it did offer an advantage, in our experience, is that the Vivoactive found and retained a GPS signal more easily in built-up city environments, making for more accurate route data when compared to the Edge on the same ride from central London to the North Downs.

But the usability and responsiveness of the touch screen let it down, especially when compared to the simple four button system of the Edge devices. Add in wearing riding gloves and a very slow screen response rate and the package is not a way to cut down tech on your wrist, handlebars or pockets. Given the popularity of the Strava smartphone app and the fact you must carry your smartphone with you, we can't see why a cyclist would bother.

Away from the sweat, mud and pedals Vivoactive is well made and attractive in a retro-1980s digital watch kind of way, which appealed to us. What didn't appeal was having to charge yet another device. Vivoactive requires a proprietary charger, again very well made, but forget this as you fly off to your cycling holiday in Majorca and you'll be out of power all too soon.

Our biggest complaint though, is the screen's slow response time, which means access to your smartphone apps via the Vivoactive isn't as impressive or useful as we'd hoped. Plus, reading texts and emails on such a small screen was a step backwards in usability compared to whipping out your phone. The notifications were handy, though, especially incoming calls.

> There's even a golfing mode where it will display the hole number, par and distance to the hole, along with your scorecard

Verdict

For us, Garmin's Edge remains a delight but while the Vivoactive hasn't won us over, it's an affordable and attractive option. Plus, if the information on offer is what you're after - and you need GPS - it's not a bad deal. ☒ **Mark Chillingworth**

SMART BULB

1byone Smart LED Bulb

£24 inc VAT

Contact
■ amazon.co.uk

Specifications
Android 2.3.3 or later; iOS 7 or later; LED bulb, 300 lumens, E27 screw fitting

Build:
Features:
Performance:
Value:

If the concept of a combined Bluetooth speaker and LED bulb sounds strange to you, you're not alone – we still find it an odd marriage. However, the 1byone isn't the only speaker-bulb we've tested: there's also the MiPow PlayBulb Color and Olixar Light Beats.



Design

Depending on your lamp or shade, you may not even see the bulb once it's fitted, but it's nice-looking, with a chrome-effect grille for the speaker. It's rated at 300 lumens, which is pretty low, and has a 3W amplifier. The bulb itself uses 6W, so that's a total of just 9W.

Using the free app for iOS or Android, you can connect to the bulb, play music and change the colour and brightness. There's also a timer section, though we could not figure out how to use it.

Part of the problem is that it's not a 1byone app, and there are different apps for Android and iOS. We mainly used the iOS version, but had to wait a couple of weeks for an update following Apple's release of iOS 9 as the app didn't work.

It's a Chinese app with poor English translations, so even with the manual suffers from the same issue, you're never entirely sure what you're doing. On the main tab is a list of all nearby Bluetooth devices – you have to choose BL_05, which is the name of the lamp.

Once connected, you can tap on the Lamp tab and control the colour and brightness. Three hundred lumens is roughly the output of a 20- or 30W halogen lamp, so it's not bright enough to light a room.

It's intended more for mood lighting, which is handy because the quality of the white light is terrible. Compared to a more expensive colour bulb such as Philips Hue, and most dedicated white lamps, the 'white' setting is very cold and bluish. There's no easy way to get a warm white hue, and even the oranges and yellows are weak in comparison to better quality bulbs.

To play music, go to the Music tab where you'll find a long list of the music stored on your phone. While the speaker is reasonably loud and can fill an average-sized living room, the quality isn't great. A light bulb doesn't make the ideal speaker enclosure, but here the quality of the whole system is mediocre.

> Depending on your lamp or shade, you may not even see the bulb once it's fitted, but it's nice-looking, with a chrome-effect grille for the speaker

If you return to the Lamp tab while music is playing, you can tap the Auto button to get the bulb to pulsate along with the music. It's a bit like a disco. Only much quieter.

There's also no way to control the lamp via the internet, nor control two or more together to play music (in synch or in stereo) or match the colour hue of multiple lamps.



Verdict

At under £25, this lamp is cheap and cheerful. It's great if you have a limited budget and want a bit of fun with colour. Sound quality isn't great and won't rival any expensive speakers, but it does the job. We'd recommend spending more on a high-quality colour bulb that can also produce nice warm white tones, but such lamps aren't available at this low price. ☒ **Jim Martin**

TAILOR-MADE EAR BUDS

Snugs Solos

£199 inc VAT

Contact
■ snugsearphones.co.uk

Specifications
SoundMagic E10; 10mm Neodymium driver; 15Hz to 22kHz frequency range; 100dB at 1kHz/mW sensitivity; 1.2m cable length; gold-plated straight stereo 3.5mm earphone body; 11g

Build:
Performance:
Value:

Depending on which in-ear headphones you buy, you usually get a selection of tips in the box. This is because one size isn't suitable for everyone. For some people no standard tip offers a good fit: they either search for better-fitting earphones or switch to over-ear headphones. However, poorly fitting in-ear headphones can be solved with custom moulds.

Snugs is a British company that produces tailor-made ear buds for the range of headphones it sells, or you can order tips for your existing set. They're the same silicone custom-fitted moulds which professional musicians, TV presenters and racing drivers use.

There are many reasons to spend money on custom-fitted headphones. For one thing, they're very comfortable. Some people hate having anything in their ear, but unlike standard tips, custom moulds don't use pressure or friction to stay in place. Instead, they're created to fit exactly into your ear, a bit like a tailored suit.

They'll also improve sound quality. Most in-ear headphones rely on a good seal for good bass. With custom moulds that's exactly what you get. And because they block external noises as well, you'll hear a clarity and detail to music and spoken audio that you simply couldn't hear before.

Price

As pricing can be a little confusing, here's how it works. If you have headphones you already like, then custom tips can be made to fit them, as long as they have some kind of mounting point as in the photo below. That means Apple-style headphones are no good.

It costs £119 to make up what Snugs calls "half shells" for these. It's an extra £10 if you want "full shells". These are deeper than half shells and enclose the earphone itself, but it's most suited to semi-pro or pro in-ear monitors, such as Shure's SE 425.

If you don't have headphones yet, you have a choice between wired or wireless. While the price on Snugs' website is £159 and £259 respectively, this doesn't include the £40 cost of having moulds made of your ears. This brings the totals to £199 and £299 respectively.



There are also other options: custom-fit ear plugs for £149, a full-shell waterproof set for £159 and 'Pro modular in-ear monitors', which are suitable for using with crash helmets: these are £259. Again, add £40 for a fitting session.

Fitting

There's a choice when it comes to fitting, too. You can either visit your local audiologist at a Boots, Specsavers or other High Street store. You'll find fitting locations on Snugs' website at tinyurl.com/ngg6453. Alternatively, you can arrange for a VIP fitting where one of Snugs team will come to you (home, work or somewhere else suitable). This costs £50.

The actual fitting appointment involves wearing what look like a pair of over-ear headphones with large holes in the middle. The audiologist then uses a clever gadget that works in tandem with the head-piece to produce a 3D model of your ear. It takes around 15 minutes to take impressions of both ears and the digital file can then be sent to Snugs HQ for the shells to be made up. It takes a few days before they arrive, but it can take longer if you need to send your own headphones. Snugs has a long list of headphones (tinyurl.com/oldnx6z) that it already has moulds for, so if yours are on the list you won't have to let Snugs borrow them.

Audio quality

When ordering your Snugs, you can choose a different colour and style for each ear – this can be a good idea as it makes it easier to see at a glance which is left and right. We went for half shells with a clear-plus-glitter effect, but the Snugs logo is engraved in red on the right ear and blue on the left to avoid confusion.

They come fitted to a pair of SoundMagic E10 headphones, which have a clever switch that lets the remote button work with iPhones, as well as Android phones or tablets. These headphones cost around £35 and offer decent sound quality for the price. As well as the Snugs hard, zip-up carry case, they come with a mic/headphone splitter cable for headset use with a PC, and an aeroplane adaptor.

They have a twisted cable that looks identical to the one Rock Jaw uses for the Kommand IEM and a one-piece machined metal body that houses a single dynamic driver.

They're a touch bass heavy, but most people will be pleased with them. You'd have to pay twice as much to get a noticeable jump in audio quality.

Crucially, the custom moulds are a perfect fit, and are well made. The silicone is initially a bit 'sticky', but Snugs provides a tube of lube along with some fitting instructions that you'll need until you've mastered the knack of inserting them into your ear canal. And – disgusting as it sounds - over time the silicone gets a little waxy which makes it easier to get the buds in and out of your ears.

Verdict

Paying £199 for a pair of £35 headphones might seem crazy, but it makes a lot of sense. It's very hard to describe the difference custom moulds make to someone that's never worn them, but trust us, it's a huge difference. ☒ **Jim Martin**

EAR BUDS

Rock Jaw Alfa Genus V2

£43 inc VAT

Contact
■ rockjawaudio.com

Specifications
8mm dynamic drivers; 20Hz to 20kHz frequency response; 108dB +/- 3dB sensitivity; 16 ohms nominal impedance; 3x pairs of grommets, 3x pairs of filters, soft carry case; Cable length: 1.2m cable; 11g

Build: ★★★★½
Features: ★★★★☆
Performance: ★★★★½
Value: ★★★★½



PC ADVISOR RECOMMENDED

You probably haven't heard of British company Rock Jaw, but that doesn't matter. What does is the quality of the headphones it produces, and the Alfa Genus V2 in-ear buds are truly astonishing for this price. Engineered by music enthusiasts who wanted to produce high-quality headphones at a price that's much more affordable than premium brands, it's clear that the team has succeeded brilliantly.

The Alfa Genus V2 is the second-generation of these headphones. They no longer have the twisted cable – also used by the firm's Kommand IEM – but instead a substantial rubber cable that resists tangling. The other change is from a wooden enclosure to aluminium.

In line with most modern headphones, the 3.5mm minijack plug is kept as thin as possible, so it will fit through the small holes in smartphone and tablet cases. However, the 90-degree bend might cause trouble if you're using a battery case on an iPhone as the plug won't be long enough.

There's a soft carry case included in the box where you'll also find three additional sets of rubber grommets, one of which should suit just about anyone's ears, though those with the smallest ears might struggle with even the smallest tips.

Something we've not seen before are interchangeable filters. Once you've removed the rubber grommets, you can unscrew the currently installed filters and swap them for another pair. In total there are three sets. Installed by default is the silver set, which enhances bass. A champagne-coloured set provides a neutral response, while the black set enhances high frequencies.

It might sound gimmicky, but swapping the filters changes the sound appreciably, so you can use the set that's most appropriate for your taste or what you're doing. For example, the champagne filters are ideal if you're editing audio and need to hear unadulterated sound – just as you'd get with monitor or reference headphones.

> Swapping the filters changes the sound appreciably, so you can use the set that's most appropriate for your taste or what you're doing

Audio quality

Having tested the Alfa Genus on various smartphones with a wide variety of content, from high-quality podcasts to different music genres, they managed to outperform RHA's MA450i – our other favourite sub-£50 in-ear headphones – in virtually every area. In fact, you'd typically have to pay around twice this much for this level of quality.

With the monitor-style filters installed, the Alfa Genus has a decent and well-rounded response that is noticeably crisper, brighter and fuller than the MA450i, which in comparison sound slightly muted. They're still great headphones, but there's an obvious step up when you switch to the Alpha Genus.

With the bass filters installed, there's a big jump in low frequencies giving punchy, warm bass, which will suit fans of rock or dance music (or anything which relies on good bass). Some may find it a little too much, but swapping to another set of filters takes less than a minute.

Unsurprisingly, swapping to the high-frequency filters means you get a much more toppy sound with very little bass. Regardless of the filter, audio remains crisp and detailed, with no muddying of instruments: there's always clear separation.

For those who want an in-line remote and microphone for making phone calls, there's now the option when ordering from Rock Jaw's website. It costs just £1.05 extra compared to the mic-less version. The single button lets you pause, play and skip tracks as well as answer a call. Unlike other headphone remotes, there are no volume buttons.



Verdict

If you want great-quality sound at an affordable price, these should be on your shortlist. ☒ **Jim Martin**

POWER BANK

Zendure A8 Pro

£59 inc VAT

Contact
■ zendure.com

Specifications
25,600mAh power bank; 80 percent efficiency; 95 percent charge remains after six months; 4x 2.1A/10.5W USB outputs; maximum total output 3.1A/15.3W; Zen+ device-recognition technology; 1.5A/7.5W Micro-USB input; charges in around 20 hours; passthrough charging; LCD display; carry case; no LED torch; 119x73x40mm; 483g; 12-month warranty

Build: ★★★★½
Features: ★★★★½
Performance: ★★★★☆
Value: ★★★★☆

★★★★½



PC ADVISOR RECOMMENDED

We're big fans of Zendure's power banks, ultra-tough, ultra-compact, stylish and loaded with features. The A8 Pro sits at the top of Zendure's line-up, a monster power bank for those with heavy-duty portable power needs or extended trips away from mains power.

With a 25,600mAh capacity and a higher-than-industry-average efficiency of 80 percent, you can expect 20,480mAh or juice for powering your phone(s) and/or tablet(s) away from the mains. To work out how many times you'll be able to charge your particular device you divide 20,480mAh by the battery capacity of your phone or tablet. A Samsung Galaxy S6 (2,550mAh battery), for example, will receive eight full charges, while an iPhone 6s (1,715mAh) would manage 12 full charges – that's an awful lot of power to keep you going away from a mains outlet.

That's assuming you want to charge only one mobile device, of course. The Zendure A8 Pro has four fast-charging (2.1A/10.5W) ports, putting it in line with the more expensive LimeFuel L240X Pro. Zendure's Zen+ device-recognition technology delivers the optimum charge for each device attached to its outputs.

It's worth pointing out, however, that the A8 Pro's maximum power output is only 3.1A/15.3W, which means it can not simultaneously support more than one output at full-speed. While it will charge all four attached devices, it will do so slower than if it had fewer attached.

With such a huge amount of power to hand, the Zendure A8 Pro can take a long time to refill over its 1.5A/7.5W Micro-USB input – up to 20 hours from empty, or longer if you have an underspecified charger (as is standard with power banks a mains charger is not supplied in the box and you should use that provided with your phone or tablet).

This input is reasonably quick, but it's not as fast as those we have seen rated at 2A/10W or, better yet, support Qualcomm Quick Charge. So it's fortunate that the Zendure supports passthrough charging, which means you can plug it into the mains and a phone or tablet into one of its outputs and both devices will charge. In charge-through mode this input will operate a little faster at 2A/10W, but the Zendure will use only the power not required by your device, meaning your attached device will charge at full-speed before the Zendure does. .

Once that power is in the bank it stays in the bank, ready for when you need it. Six months after charging your Zendure, you should find 95 percent of its capacity remains even if you haven't used it.

Display

One feature we particularly like in the A8 Pro over the LimeFuel, and one that we've not seen before in Zendure power banks, is the digital LCD screen. By pushing the small button on the front of the Zendure you can get an exact readout of how much capacity remains, so you won't get caught short. This is a much more user-friendly solution than the four LEDs used by most power banks to show remaining charge.

That's all this power button is used for. The Zendure will begin charging a mobile device as soon as it is plugged in, and unlike many other power banks on the market there's no built-in LED flashlight for it to activate. For a device of this size we don't have an issue with this.

And it is a large device – as you might expect, given the capacity. But for a 25,600mAh power bank, we think its 484g weight and 119x73x40mm dimensions are impressive. You might not want to slip it into a pocket, but throwing it in a bag or rucksack is no problem.

The silver A8 Pro has the same ribbed, ultra-tough design as the smaller models in the Zendure series, encased in a crushproof PC/ABS composite material with dual-injection moulding and a shock-absorbing central belt. Zendure has demonstrated its power banks' ability to withstand the weight of a McLaren Spider, so we're fairly certain you won't need the included carry bag for anything other than keeping with it the flat grey Micro-USB cable.

Aside from the aforementioned LED torch, the only thing really missing is Qualcomm Quick Charge support. It's something we'd like to see in a future generation of Zendure but, for now, the feature is primarily supported by flagship Android and Windows phones – cheaper devices, iPhones and iPads wouldn't benefit. Plus, with 10.5W possible from a single output, this Zendure A8 Pro is plenty fast

USB-C is another one for the future, only recently breaking into the power bank market, but we're really grasping at straws here.

Verdict

Incredibly well designed with excellent features including passthrough charging and an LCD panel, a tough build and huge amounts of power, that the £59 asking price doesn't look so high after all. ☒ **Marie Brewis**

BLUETOOTH TAG

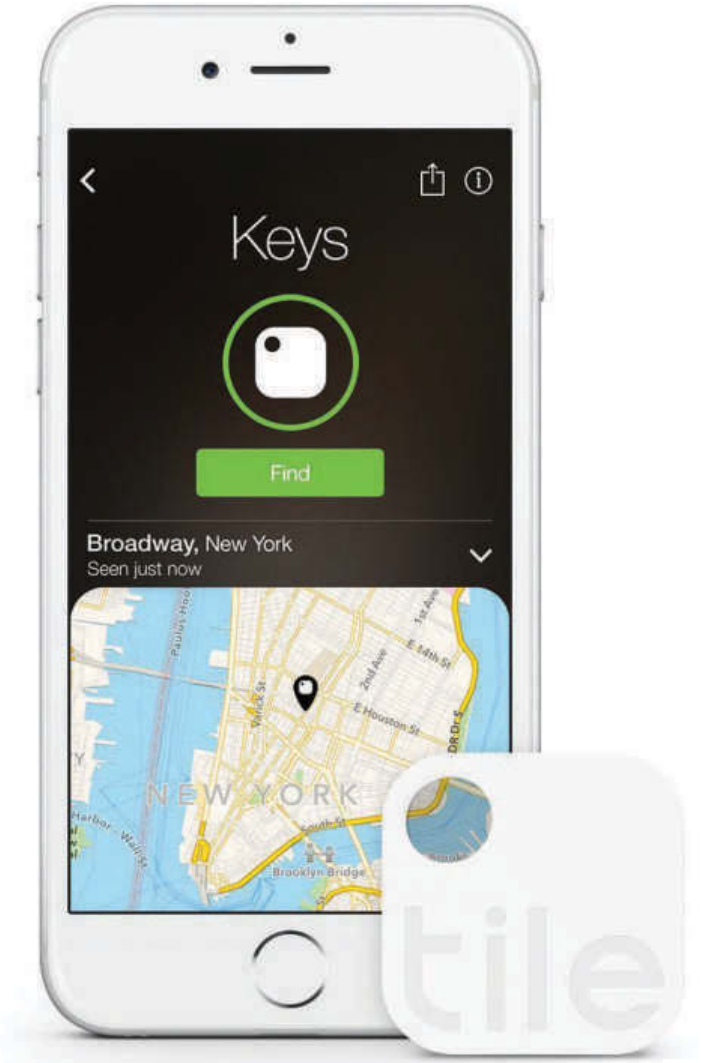
Tile Gen 2

£30 plus shipping

Contact
■ thetileapp.com

Requirements
Compatible iOS or Android device with Bluetooth 4

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★★☆
Value: ★★★½☆



We first heard about Tile way back in June 2013. It turned out to be a very successful crowdfunded project, raking in $2.5m from thousands of people wanting a way to keep track of their precious items. We finally received one in July 2014 and now have the updated second-generation version. These include a speaker that's three times louder at 90 decibels. Previously, it was too quiet to hear if there was even moderate ambient noise. Plus, you can now use the Tile to find your phone.

The first thing you'll notice about the Tile is that it's larger than you probably thought it would be. We did, at any rate. It's not too big to attach to a key ring, but at around 5.5mm it's twice the thickness of an average key and wider than most car key fobs.

Unlike at launch there's now an Android app, which requires Android 4.4 or later. You can use a Tile only with an iPhone or iPad – one that has Bluetooth 4.0 low energy.

The app is free, and it's easy to pair the Tile: you press the 'e' and it plays a short tune to let you know that it's in pairing mode.

It then works much like the Find My iPhone app in that you can see when the Tile was last 'seen' – or in Bluetooth contact with your iPhone or iPad – and a map of its location.

If you were to lose the object that the Tile is attached to, you can go to its last known location and start searching. Bluetooth 4.0 LE's range is bigger than you might think at up to 150 feet, so you don't have to be right on top of the Tile before the app can connect to it.

Until it's in range, the app will show 'Out of range', but when it connects, a green Find button appears. This causes the tile to play a Donkey Kong-style tune. In a quiet house you'll track it down easily, but it's a harder prospect if you've lost it near a busy road.

It's still not obvious in the current version of the app that you can tap the Tile icon inside the green circle to display a distance gauge. The segments fill up as you get closer to the tag, but there's no indication which direction to go.

If you return to the place the Tile was last seen and you're still out of range, there is another way to find it, though this relies on other Tile users. It's called Community Find, and it's a clever system. Whenever the Tile app is running on anyone's phone or tablet, it logs the location of any other Tiles that it detects.

You wouldn't know that, as no information is shown apart from the location of your own Tiles (you can have up to eight of your own connected to the app). However, should any of those other Tile owners lose theirs and your app picks up the location, it will be shown in their app even though there was no Bluetooth connection.

There are some stumbling blocks here. One is the user base. Until lots of people who live and work near you own Tiles, you won't be able to use Community Find. .

Battery life is still an issue. It lasts roughly a year, and isn't user replaceable. This is because the case is sealed to make it splash proof. Basically this makes it more like a subscription service. We'd far rather the option to replace the battery and trade off waterproofing.

Tile has also increased in price slightly, but it's the cost of shipping to the UK that's the problem. Last year a Tile cost $20 with $14 delivery. Now it's $25, plus $21. That's around £30. However, if you buy a pack of four (currently $70) this works out as £60 including delivery, so that's half price. It's still more expensive than the £11.50 cost when you bought three last year, but not bad if you need all four or can split it with a friend.

As we mentioned at the start, there's a new feature in the second-gen version: find my phone. This is a bit more convenient than Apple's and Google's systems as you can press the 'e' on your Tile and your phone will play a loud tune even if it's on silent.

Verdict

As Tile admits, small tracking devices are nothing new. What's different is that it uses Bluetooth. If you're the sort of person who's always losing their keys around the house, Tile is ideal. ☒ **Jim Martin**

INKJET PRINTER

HP Envy 5540

£79 inc VAT

Contact
■ hp.com/uk

Specifications
4-colour (CMYK) inkjet printer; print resolution, 1200x1200dpi; scanner resolution, 1200dpi; connectivity – Wi-Fi; USB; Apple AirPrint; primary paper trays, 125 sheets A4; secondary paper tray, 15 sheets 10x15cm; 156x454x410mm; 6.8kg

Build:
Features:
Performance:
Value:



Costing just under £80, the Envy 5540 provides a printer, scanner and copier in a compact unit that measures just 156mm high, 454mm wide and 410mm deep. The black plastic box doesn't look particularly exciting, but HP has managed to squeeze in two paper trays – the main tray holds 125 sheets of A4, while the second can accept 15 sheets of 10x15cm postcard paper, so you can switch between photos and conventional documents without having to replace the paper.

There's a USB port, though we imagine most people will prefer the convenience of the built-in Wi-Fi, which supports Apple's AirPrint for iOS devices. There are apps available for Android, Windows and Chromebook devices, too.

It even manages to include automatic double-sided printing, which is relatively unusual for a printer in this price range.

Print quality is very good, with smooth, sharp text and graphics that will meet the needs of people who work from home, or students who need smart presentation for reports or essays. It's not all that fast, though. While in our tests, it managed a respectable 10 pages per minute for text documents, we found text and graphics pages were more sluggish at around 4ppm.

fact that the printer offers both standard and high-yield XL-size cartridges, as well as three different subscription options for HP's Instant Ink scheme – for details see page 112.

The standard-size black ink cartridge costs £10 and lasts for just 200 pages of mono text, while the three-colour ink cartridge costs £15 and manages only 165 pages. That works out at a hefty

There's a USB port, though most people will prefer the convenience of the built-in Wi-Fi, which supports Apple's AirPrint for iOS devices



Photo prints also came out very well when using glossy photo paper, and took a reasonable 65 seconds for a postcard print. However, the Envy prints only with four coloured inks – cyan, magenta, yellow and black – so serious photographers may prefer to opt for a dedicated photo printer that uses extra inks.

Low cost printers such as this often come with a sting in the tail, in the form of very expensive replacement cartridges, However, calculating running costs for the 5540 is complicated by the

5p per page for mono and 9.1p for colour. The XL cartridges are a little better – both cartridges cost £20, and you'll get 600 pages from the black cartridge and 415 from the colour cartridge. That brings the cost of mono printing down to 3.3p per page – which is still high – while colour printing comes down to a more reasonable 4.8p.

Verdict

The HP Envy 5540 is good value for people who need to produce a lot of colour documents or photo prints, and provides good quality for such a low-cost printer. However, simple mono text documents remain relatively expensive and there are cheaper options available if you need to print a lot of mono documents on a regular basis. ☒ **Cliff Joseph**

SOFTWARE

Apple OS X El Capitan

Free

Contact
■ apple.com/uk

Requirements
OS X 10.6.8 or later;
6.17GB drive space



In these days of free operating system updates, major OS X updates feel much more routine than they used to. Apple has chosen not to roll out major features piecemeal throughout the year though, which still makes this the biggest change your Mac will experience this year.

El Capitan is very much a refined version of OS X Yosemite, a recognisable progression from its predecessor. (In iPhone terms, it would be Yosemite S.) Apple says this update is all about a refined user experience and improved performance. But it's traditional for Apple to take its no-big-deal upgrades and add in a bunch of new features anyway, and El Capitan is no exception. This is a packed release, and one that makes sense as a follow-up to Yosemite.

The basics

Often people are cautious about upgrading their computers. After all, if an application you rely on is incompatible with the new operating system, your entire workflow can be affected. It's worth checking with the developers of any programs you rely on before upgrading – most will post compatibility information on their websites.

Most major OS X upgrades feature a lot of under-the-hood security improvements, which is a good reason to stay up to date.

One of these is a feature called System Integrity Protection, which clamps down on malware's ability to hijack your Mac by masquerading as a user with system-administration privileges. While this is a good thing, you may find that some programs rely on that same vector to do their jobs. You can turn off System Integrity Protection if you absolutely need to, but most software will be able to function with it turned on.

Mission Control

There's a devoted (but small) subset of Mac users who love using Mission Control (formerly Exposé) to arrange their windows and workspaces, or frequently use Full Screen mode for apps. If you're one of those people, or if you've always been tempted to improve how you organise your workspace, we've got good news for you – El Capitan offers loads of boosts to Mission Control and Full Screen Mode.

The most notable addition is Split View, a feature that also appears on the latest iPads in iOS 9. Unlike Apple's tablet, though, Mac users have always been able to run two windows next to each other. What Split View does is add an extra dimension of utility to full-screen view. Now it doesn't just have to feature one program stretched out to take over your entire screen – you can split the space between two programs, one on the left side and one on the right.

To enter Split View, click and hold on the green plus/maximise

Split View



button in a window's title bar. You'll be prompted to choose which side of the screen you'd like that window to be placed on. Mission Control will then activate on the other side of the screen, letting you select any of your currently open windows to use as the first window's split-screen companion.

Converting full-screen mode to split-screen mode isn't without its interface quirks. We noticed that, depending on how an application presents itself in full-screen mode, sometimes it could be very hard to tell which program was active/frontmost. That sometimes led to unexpected behaviour – for example, we tried to zoom in on a PDF in Preview by spreading our thumb and index finger on our Mac's trackpad, but it didn't work because we hadn't clicked on the correct window to activate Preview.

Since it seems that Split View is just a modified version of the old full-screen view, there are probably going to be some quirks like this until they're updated for El Capitan.

Like full-screen view, we're not sure that Split View is going to appeal to anyone but users of MacBooks, and even then, it's more likely to suit smaller models. If you've got a large monitor, full-screen view is often overkill, because few applications are designed to take up all that space. But at least with El Capitan, you've got the option of having two different apps share full-screen view. On a smaller display, such as an 11in MacBook Air, it's a nicer experience.

Perhaps our favourite improvement is to Mission Control itself. The entire feature feels friendlier and does a much better job of organising and presenting your open windows. Every window gets its own thumbnail, rather than piling all of a program's windows in a big stack. Plus, when you engage Mission Control, your windows don't fly all over the place. Yes they slide around in order to bring every window into view, but the feature keeps geography in mind. This means that a window that's in the top-right corner of the screen will stay near the top-right corner when Mission Control is activated.

The Spaces Bar – the strip at the top of the screen that appears when you activate Mission Control – has also received a significant upgrade. First, it's collapsed by default, giving more space to your windows whenever you activate Mission Control. When you move your cursor over the Spaces Bar, it expands. You can also drag a window to the top of your screen and Mission Control will activate with the Spaces Bar expanded, so you can add a window into a new or existing workspace.

Finally, in a boost to the new Split View feature, if you move your cursor over a space that contains two applications in Split View, you'll see a small icon that allows you to blow the Split View apart, bringing both windows back to your existing workspace. When you click it, you'll see the two windows slide back into their place in the Mission Control landscape.

Search

Between Siri and Spotlight, Apple continues to build up its collection of searchable data sources. On iOS, Siri and Spotlight seem to be merging. On OS X, those data sources crop up in a bunch of different places. With El Capitan, Spotlight and Safari both have access to weather, stocks, sports, transit and web video, and support for natural-language queries.

Yes, this means you should be able to type "Chelsea standings" into Spotlight and be given the bad news from the Premier League. It also means you can type queries such as "pdfs from June 2013" or "presentations from August 2012" into Spotlight or Finder and get the result you're expecting.

We like this approach, because the fact is that many people search using natural language queries regardless of whether their search engine of choice supports it. A lot of us want to type, "how do I delete my Facebook account" into Google, rather than carefully crafting a string of search terms. So Spotlight gets smarter, we get to be lazier, and it should all work out.

There's one improvement that we applaud wholeheartedly, and it has to do with the Spotlight window itself. Last year, Yosemite cut the cord between the program's window and the icon in the top-right corner of the Menu Bar. It floated in the middle of the screen, disconnected from the icon it was supposedly attached to. Now with El Capitan, you can move the Spotlight box anywhere you want, and resize the results window, with the icon serving as nothing more than a shortcut.

Safari

Safari 9 has some clever new features, including Pinned Sites. These are a simpler, more visual version of the Favorites Bar. Drag a tab into the left corner of Safari's title bar and it will stay there, with a little icon to distinguish it.

Pinned Sites are kept refreshed, so with one click you can see what's new on your favourite site. Clicks that lead to other pages on the site are loaded in the Pinned Site's tab, while external links all open in separate tabs

This feature does change Safari's keyboard shortcuts and tab behaviour, though. Since Pinned Sites are always open, if you try to close a Safari window when viewing a Pinned Site, it will switch you to

Mission Control





a new tab instead. If you have a single tab open that's not a Pinned Site, it will close the entire window. But if you open a new window and navigate back to the Pinned Site, you'll find that it's still on the page that you last visited.

If you're used to navigating the first item in the Bookmarks Bar by typing ⌘-1, you'll also have to get used to a change. The ⌘-number shortcuts are now reserved for navigating Pinned Sites and browser tabs, moving from left to right. You can also access all the Bookmarks Bar items by adding in the Alt key, in the format ⌘-Alt-[number].

Nobody likes blaring audio from pages that automatically play videos when the page loads, and if you're someone who likes to open articles in multiple tabs, you can very quickly have several different videos playing in different tabs. In Safari 9, you have greater control over where audio plays in your browser. Click on the speaker icon in Safari's Smart Search bar to mute the audio in the current tab. Or click and hold on that icon, and you'll see a list of all tabs that are playing audio – with the option to mute the sound from the currently open tab or from all the non-visible tabs. You'll also see a list of all tabs that are playing audio in that list.

Safari Reader, which gives you a simplified view of a complicated page layout, has added more display preferences. In the Yosemite version of Apple's browser, you can make the text larger or smaller, and that's about it. In Safari 9, you can not only adjust text size, but also choose from four colour themes and eight typefaces. It's a good look, especially when we're reading at night and prefer a light-on-dark theme.

Finally, anyone who has been frustrated that they can't easily share a video they're watching in Safari and play it on their TV – something that's easily done on an iOS device – will be happy to know that this is now possible. If you're playing a compatible movie, you'll see an AirPlay icon. Click this to send that video to an Apple TV.

Notes

Nobody likes the Notes app. The App Store is full of alternatives that outdo it at the job of taking notes, creating shopping lists, and so on. It does have one major thing going for it though, namely it's on every Mac and iOS device. We admit it: we use Notes for all sorts of things.

Notes has received a major upgrade in El Capitan. You can now stick a bunch of different files, such as PDFs, images and videos, into a note. You can also sketch notes on iOS and view them on the Mac. Notes is also an option in the Share button, so you can send data to it from any compatible app.

To create a checklist, select some text and click the Checklist button in the toolbar. That's it – every line gets a small checkbox in front of it, and you can check them on and off.

Up to now, Notes was one of the rare Apple cloud-connected apps on OS X that didn't use the iCloud infrastructure. Instead, it connected to a special IMAP mailbox in one of your connected email accounts. (If you've ever searched your Gmail and seen a dozen different notes files in your results, this is why.) But starting with El Capitan, Notes can also use iCloud proper. In fact, for most of the more advanced features – including checklists, links, and access to the type style menu – you'll need to use iCloud. Fortunately, you can drag your old notes from an email account into iCloud, and they'll transfer over.

Photos

The biggest addition to Photos in El Capitan concerns the editing of image data. You can now add location information to either a single photo or an entire batch, and batch-change titles and other information. To do this, open the Inspector window. A not-yet-geotagged image will offer a section of the window labelled Assign a Location. Clicking in this area will let you enter a street address or a name of a point of interest, and the program will search Apple's Maps database. You can also click on the pin and drag it around the map, placing it wherever you like. To batch-change titles, descriptions, or keywords, select a bunch of images and input the new information into the Inspector window.

One complaint we've had about previous versions of Photos is its lack of flexibility when it comes to sorting albums. Now, however, you can sort them by date and title, as well as keep them in a custom order that you determine by dragging images around.

Photos on El Capitan also supports image-editing extensions written by third-party developers. If there's a particular editing effect or tool that isn't available in the program, a developer can write an extension that provides that feature, and it can be accessed from within the application.

While you can edit images using Extensions within Photos, they aren't as integrated as the built-in tools. Basically, the edits that you make in an Extension are done on top of a version of your photo. If you've applied other effects, those effects are 'burned in' – you can't apply a black-and-white effect, then add some distortion effects with an extension, and then remove the black-and-white effect. Fortunately, Photos always lets you revert to

the original version of the image if you need to start again.

Adding Extension support to Photos opens up a whole new set of capabilities, from the serious to the silly, all without ever needing to leave Apple's next-generation photo editor. It's a good thing.

Other bundled apps

Of course, every OS X update brings upgrades to many of Apple's other apps. Mail and Maps both received nice updates this time around.

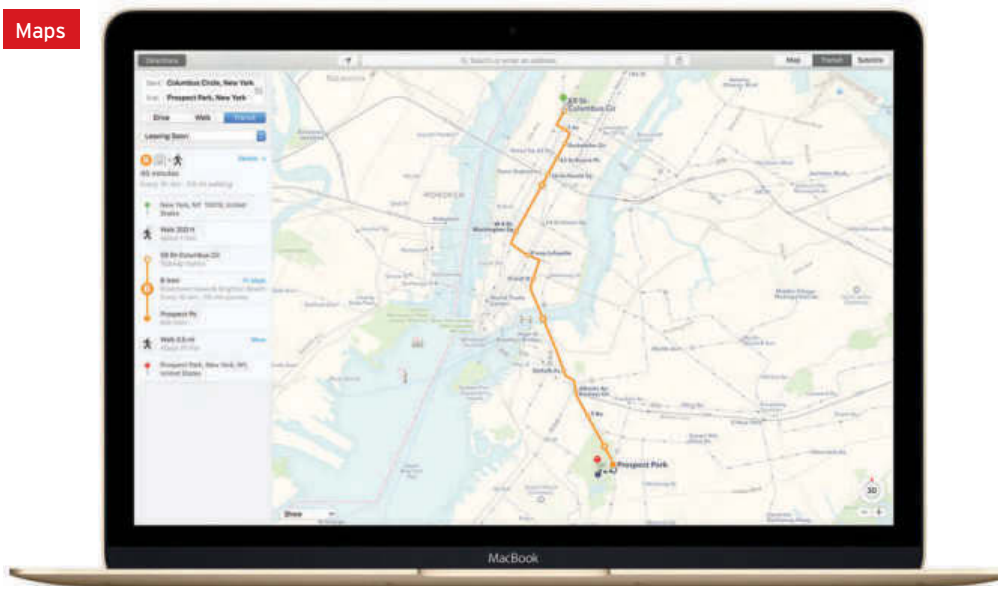
Taking a cue from iOS and from some third-party competitors, Mail now allows you to use the trackpad to swipe messages into the trash or to mark them as unread. Trackpad-oriented users will appreciate the shortcut, and there's a preference to let you choose whether a swipe deletes a message or archives it.

For some time now, OS X has had the ability to detect certain kinds of content in your email messages – names of contacts, events, dates and times. In El Capitan, Mail does a much better job of putting that information in context. If a potential event is mentioned in the text of an email message, such as 'let's have lunch on Thursday', Mail will add a banner above the top of the message body that displays the event and provides an 'add event' link to quickly add it to your calendar. Likewise, if the person mailing you doesn't appear in your Contacts list, the app will show a banner indicating that it's detected a possible new contact with a quick 'add contact' link.

Our favourite feature is one that fixes a long-standing problem with the app. Perhaps because it was developed at Apple's campus, replete with high-speed Internet connections, Mail has had a major blind spot: poor performance on slow connections. This has been addressed in El Capitan, and the program now prioritises showing you new mail in your Inbox rather than sync all your IMAP mailboxes, and therefore preventing you from accessing you email. It's an improvement that's been a long time coming, but it's finally here.

The headline feature in Maps is public transport maps, which are available in London, Paris Berlin, New York, San Francisco and over 300 cities in China. When we're planning a trip, we usually first explore the trip on our Mac but, of course, when we're making the actual journey we're using our iPhone. In El Capitan, we can directly share the route with any other iOS device connected to our Apple ID, so we can send my trip directly to our iPhone (and Apple Watch) with a couple of clicks.

Maps



Games, in particular, should benefit from the switch to Metal – assuming they are built to take advantage of it. Sharing a graphics technology with iOS should help developers create titles for both OS X and iOS. Adobe, too, has committed to using Metal in a future update to its Creative Suite.

Improving performance

Under the hood, Apple has made changes you might not notice but are of huge benefit. For example, Metal, its graphics technology, has been brought over from iOS and replaced the old OpenGL technology. Many of OS X's key graphics frameworks, including Core Animation and Core Graphics, now use Metal rather than OpenGL. The end result should be that all sorts of parts of the Mac interface should feel snappier.

Verdict

There was a time, only a few years ago, when OS X updates were fraught with 'should-I-or-shouldn't-I' peril, along with a real price tag. Those days are long gone.

Should you update to OS X El Capitan? Unreservedly yes – we've found it to be stable, it's free, it'll download and install itself on your Mac with nearly no intervention, and it'll bring with it improved security, speed, and functionality. ☒ **Jason Snell**

Mail



SKYLAKE

Paul Monckton puts six of the latest Skylake-based PCs through their paces

On the first of October, Intel released the sixth-generation Intel Core processor family. Often referred to under the codename 'Skylake', these new processors have been optimised for Windows 10, with specific support for Cortana and Windows Hello baked in. The model of most interest to desktop-based gamers will be the two new 'K' series chips, both of which feature an unlocked multiplier, allowing system builders to overclock the chip to achieve maximum performance.

We've tested six of the latest Skylake-based gaming PCs with a maximum price of £1,000. Each comes fitted with the Core i5-6600K processor, coupled with graphics capable of high-quality Full HD gaming. Remember, many of these review models have been designed exclusively for *PC Advisor* at ultra-competitive prices you won't find elsewhere.

Buying advice

You still can't beat a desktop PC when it comes to the ultimate gaming experience. With the right processor and graphics card, you can achieve high-quality visuals that will leave even the best consoles in the dust. Plus, you get to enjoy all the game modifications you desire. You also get high-performance for all your non-gaming needs and that graphics card will also offer a considerable speed boost to other programs such as photo- and video-editing software. The desktop PC is also the only platform suitable for running the latest VR headsets.

Processor

Different games place different demands on your computer hardware, but choosing a gaming PC will involve a balancing act between CPU and graphics performance.

For gaming PCs, we're happy to allow overclocked processors, which will significantly increase your overall processing power without having to stump up for the most expensive chips. All of our review systems have 3.5GHz Intel Core i5-6600K processors overclocked to varying degrees, with the fastest running at 4.5GHz.

To keep the overclocked chips cool, all have been fitted with third-party processor coolers, some using the traditional heatsink and fan design, while others opt for a liquid coolant pumped through a radiator.

Overclocked processors place additional demands on the system's power supply and also require better cooling, so expect to pay more for PCs with more extreme overclocking. You can overclock the chip yourself if you wish, but it can be a good idea to buy a pre-overclocked system such as the ones reviewed here, which are covered by the manufacturer's warranty when running at the higher speed.

Motherboard

There are several points to consider when choosing the right motherboard for your PC, if you're not into technical details you may be tempted to overlook the motherboard and concentrate on the processor and graphics, but the motherboard is extremely important.

Because the Skylake processors are relatively new, there are fewer decisions to be made than on previous platforms. Your new Skylake PC will be using the Intel Z170 Express chipset which supports dual-channel DDR4 memory, and processor overclocking. Individual boards will however, offer different feature sets. So you'll need to think about whether you want the new USB 3.1 sockets or a high-performance PCI-Express M.2 SSD, such as the one fitted to Chillblast's Fusion Krypton. Premium motherboards may offer additional features such as the higher-quality built-in audio of the Gigabyte GA-Z170X-Gaming 3 used in Mesh's Skylake PCA system. Gaming motherboards also tend to offer a selection of extras you don't often get on standard models. These can include cosmetic enhancements such as better looks and even colour-changing LEDs, but also faster network cards designed to reduce lag and higher quality audio components.

Lastly, your motherboard will also have to be the correct size to physically fit in your chosen system case. Larger cases leave you with more options, but can take up a lot of space. The more compact designs will require a smaller form factor motherboard, such as the mATX model used by Chillblast.

Graphics card

It's usually the graphics card that will determine the overall quality of your gaming experience. Once your processor is fast enough, it's down to the graphics card to deliver the game to your screen. This is why we suggest gamers opt for a Core i5 processor rather than the more expensive Core i7, as the difference in price will almost certainly serve you better spent on the graphics card rather than on the CPU.

To ensure the smoothest possible gameplay, you generally want to achieve a minimum of 60 frames per second (fps) in your game. This is the limiting speed of most PC displays, so you won't really need to go faster than this unless you have a high-speed gaming monitor which allows for faster refresh rates.

Any extra performance will then allow you to increase the quality settings in your game, making characters sharper, textures more realistic, and graphical effects more immersive. Four of the systems here use graphics based on nVidia's popular GeForce GTX 970, which delivers excellent performance for the price. The equivalent AMD option comes in the form of the Radeon R9 390. These cards jostle for supremacy, the result depending largely on the particular games you play and which of the two graphics card companies have

PCS



Photography by Dominik Tomaszewski

the better-optimised code in any given title. Don't worry too much about choosing between AMD and nVidia. As is usually the case, it's down to which graphics card vendor has done a better job optimising any particular game for performance on its own cards. If you have an idea of which games you want to play, it can be worth investigating how well any given card performs with those particular titles before you make your final decision.

Cooling

Cooling is essential if any CPU is not to overheat, but especially one that's been overclocked. The basic Intel CPU cooler vendors often fit will save you money, but it can be noisy and won't keep your processor as cool and will need careful attention paid to airflow through the case.

Expensive water cooling systems allow for extreme overclocking, but more modest budgets will generally allow for a smaller, sealed liquid-based coolers such as the Corsair Hxx range. Alternatively, you can opt for a heat-pipe based cooler, which will give better cooling than a standard model while making less noise, thanks to larger, slower-moving fans.

Gamers like their systems to look the part, but the case needs to be practical. Internal cable management aids airflow, while fan controllers let you reduce noise or boost cooling as necessary. Graphics cards can also come with various cooling systems, the more advanced of which can allow for faster clock speeds on the GPU and less noise from the graphics subsystem when playing games.

Monitor

For more immersive gameplay, opt for the largest display you can find and one with a good contrast ratio. A fast response time will ensure that fast, frenetic gameplay remains free of blur, although not everyone will notice any difference. TN-based monitors will cost less and provide most of these features, but IPS-based displays will give you better overall colour reproduction and wider viewing angles, although response times tend to be slower. For a more responsive display, go for a gaming monitor with a high refresh rate of 120- or 144Hz, although you'll need powerful graphics to supply frames at this speed.

For the very smoothest gameplay from an nVidia graphics card, look for a monitor that supports nVidia G-sync. With G-sync, the monitor stays in step with the graphics card rather than the other way around. This means less blurring or image tearing even at lower framerates and will be of great benefit to mid-range graphics cards such as those found in these PCs. AMD offers a competing technology called 'FreeSync', which will soon be available for displays connected to AMD graphics cards.

Peripherals

If you're using your PC on a desk with a monitor, you'll benefit from the improved responsiveness of wired devices. Look for high-resolution mice, and keyboards with programmable keys and backlighting.

High-grade mechanical switches in keyboards have a better 'feel' and provide longer life than cheap membrane switches. Some draw attention to the W, A, S, D keys with a different colour or texture. A gaming sound card can provide a more immersive experience by adding multiple sound effects, with improved audio fidelity. Also consider a gaming headset with a built-in mic.

However, if you're planning on playing from the sofa, you'll want wireless controllers. For keyboard input, we would recommend a wireless model that comes with an integrated pointing device, such as a trackball or trackpad.

We're not used to seeing many gaming PCs coming with optical drives these days, but three come fitted with DVD writers. If you're still playing games delivered on disc, you may need one of these, otherwise you could easily save a few quid by culling it from the spec. They're relatively simply to add afterwards if you change your mind – especially if you go for an external model.

Power consumption and noise

If you're using the PC as a home entertainment hub, you'll want to consider idle power consumption and noise. The more you overclock your PC, the more power it will consume and the louder it will become.

Warranty

Warranty terms are crucial when it comes to gaming PCs, and a key advantage of buying a pre-built overclocked system is that all of the overclocking will be tested and covered by the vendor's warranty.

The longer the warranty the better, but also look for a collect-and-return rather than return-to-base option. Also pay attention to whether parts and labour are both covered and for how long.

Gamers like their systems to look the part, but the case needs to be practical. Internal cable management aids airflow, while fan controllers let you reduce noise or boost cooling





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Performance	★★★★★
Value	★★★★★
Overall	★★★★½

PC ADVISOR RECOMMENDED

Chillblast's Fusion Krypton system certainly stands out from the crowd. Housed in the company's own small form factor 'Kube' case, the PC sits lower on the desktop, taking up less space than a full-sized alternative. The case is finished in a matt black softcoat, with what Chillblast describes as a "touchy-feely" surface, lending the whole system are rather expensive-looking finish, despite it being one of the least expensive PCs of its kind.

Inside the case, the PC is lit with deep blue LEDs, which glow through the mesh front and illuminate the internal components through tinted windows on either side of the system.

Components can be accessed from either side of the case or my removing the top panel to look down on the motherboard from above. Inside, the motherboard tray and drive bays are coloured blue, to match the internal light show.

Like all of the PCs in this group test, the Fusion Krypton is powered by an Intel Core i5-6600K 'Skylake' processor. In this case, it has been overclocked from 3.5GHz to a respectable 4.4GHz, and installed in an Asus Z170M-Plus mATX form factor motherboard.

The smaller-sized motherboard is necessary to fit in to the Kube case, and size constraints force the removal of a couple of PCI slots found on full-size versions, such as the Asus Z170-P found in The Eclipse SuperNova i566n9700C. The Chillblast, PC is nonetheless packed with features, including support for USB 3.1 Type C, fanless heatsink design, individual fan controls and M.2 support with SATA Express. It also offers excellent overclocking support, should you wish to tweak the performance beyond what Chillblast provides as standard.

Graphics performance comes from an MSI-branded nVidia GeForce GTX970, which delivers excellent performance for the price. This particular model features a large twin-fan cooler and has been factory overclocked, giving the Fusion Krypton a small edge in performance and some of the fastest gaming results of the group.

The Fusion Krypton's CPU is cooled by an Akasa Nero 3 CPU Cooler which runs quietly, although a couple of degrees hotter than most of the competition under full load. Not that this is anything to worry about, unless you're planning on attempting some extreme overclocking of your own.

General computing performance is also very good. The PC's Samsung SM951 M.2 SSD easily outclasses the competition in raw speed, although we feel its 128GB capacity is a rather small, which could cause users to run into problems later if they're not careful to ensure anything that isn't speed-critical is installed on the accompanying hard drive instead. Thankfully, the hard drive is a roomy 2TB model rather than the 1TB versions we're most used to seeing in similar review systems. You also get a full 16GB of DDR4 RAM where others have dropped the amount to 8GB to cut costs.

Our review system comes without an optical drive but a 24-speed DVD burner can be added for £19.99 or you can provision a Blu-ray writer for £69.99. Without Chillblast's suggested AOC U2868Pqu 28in 4K monitor, the Fusion Krypton comes in at just £869, making it the least expensive option, yet also one of the fastest. (It's £1,119.98 with the screen.)

VERDICT: Excellent performance, top-notch build quality and Chillblast's usual five-year warranty make the Fusion Kube an excellent choice, as long as you don't need the expansion capabilities of a full-size system case or motherboard. It's also great value for money.



CYBERPOWER INFINITY X55 SE

£999 inc VAT • cyberpowersystem.co.uk

Build	★★★★½☆
Features	★★★½☆
Performance	★★★★½
Value	★★★★☆
Overall	★★★★☆

The Infinity X55 SE from Cyberpower, is a rugged-looking desktop PC, with chopped off corners and a protruding front grill that give it an industrial, almost military look marking it out immediately as a gaming PC. You also get a full-size transparent side panel, through which you can see the internal components illuminated by blue LEDs, which also shine through the grille at the front. This is the Corsair Carbide SPEC-01 system case we've seen housing gaming PCs for some time now. You'll either love it or hate it.

Visible through the window are the large heat pipes of the graphics card, and the black tubing of the Corsair Hydro H55 liquid-based CPU cooler keeping the Intel Core i5-6600K in check. In this system, the CPU has been pre-overclocked from 3.5- to 4.2GHz. This is a significant increase in speed, albeit somewhat unambitious alongside the 4.4- and even 4.5GHz systems challenging it in our Skylake gaming PC group test.

The CPU is teamed up with 8GB of 2133MHz DDR4 RAM and installed in a Gigabyte Z170-HD3 motherboard, where it's supported by a 120GB Kingston V300 SSD and a 1TB Seagate hard drive.

This motherboard does the job, but is a little short on features. It supports two-way AMD CrossFire technology to allow the installation of a second graphics card, but the second PCI Express x16 slot is limited to x4 speed, which will hamper performance. It's also the only Skylake-compatible motherboard in this group test not to support USB 3.1. By contrast, Mesh's Elite Skylake PCA features the GA-Z170X-Gaming 3 motherboard, which rectifies both of these omissions in a system costing the same price as the Cyberpower Infinity X55 SE.

This PC is unique among our round-up of Skylake PCs in that it uses an AMD graphics card, rather than the nVidia GeForce GTX 970 found in every other system. In this case, Cyberpower has selected an AMD Radeon R9 390 card from VTX3D. These cards are matched price-wise with the nVidia GTX 970 cards, but offer double the RAM, at 8GB, and offer rather different performance characteristics depending on which games you choose to play.

In our tests, the Cyberpower Infinity X55 SE trades places with nVidia-based PCs depending on which game test we're running, but generally performs well, especially at Alien vs Predator. It does come in behind the nVidia boards at several other tests, but its extra RAM capabilities also allow for larger textures to be used and will require slightly different tweaking of game settings to achieve optimal performance. Future games are also likely to make much more use of video RAM, which also plays to the Radeon's strengths. One disadvantage of this card, however, is power consumption. When running flat out, this system consumed 520W of power – somewhere in the region of double that of competing PCs built with nVidia graphics cards. Thankfully, Cyberpower has included a beefy 750W Corsair Builder Series PSU to make sure it gets all the juice it needs. Unfortunately, the Infinity X55 SE is also the loudest PCs of the group – often the consequence of high power consumption which leads to increased heat output and faster fan speeds.

VERDICT: The Infinity X55 SE performs well, but not as well as much of the competition thanks largely to its unambitious 4.2GHz maximum clock speed. It also boots from a rather small SSD without the large performance advantage of an M.2 model. Some will love the AMD graphics card with its huge video RAM capacity, but overall the price seems a little high for what you're getting.



ECLIPSE SUPERNOVA i566n9700C

£899 inc VAT • eclipsecomputers.com

Build	★★★★☆
Features	★★★★½
Performance	★★★★☆
Value	★★★★½
Overall	★★★★☆

The rugged, industrial styling of the Eclipse SuperNova i566n9700C ensures that there's no mistaking it for anything other than a gaming PC. Closest in appearance to Cyberpower's Infinity X55 SE, the Corsair Carbide Spec-03 case used here adds a few more moulded details and a more imposing grille, making it either the most badass of the bunch or perhaps the ugliest, depending on your preference. A mesh panel front allows a red LED to shine through from the front, while the side window panel gives a clear view of the internal components – not that there's really a whole lot to look at.

Cooling the overclocked Intel Core-i5 6600K processor is a Zalman CPS11X Performa heatsink and fan combo, above a Palit nVidia GeForce GTX 970 graphics card. Cyberpower has overclocked the main CPU from 3.5- up to 4.2GHz, while the graphics card runs at nVidia's default stock speeds. This immediately puts the Eclipse system at a bit of a disadvantage against PCs that run the CPU faster and come with factory overclocked graphics cards.

Storage is provided by a 240GB Kingston HyperX Fury SSD, paired up with a 1TB Seagate Barracuda hard drive. We're pleased to find a decent capacity 240GB SSD installed here, as it's much less hassle than a 128GB model that needs a little more care to ensure it doesn't fill prematurely. It's not as fast as the M.2 SATA Express SSDs provided by Chillblast and Mesh, though. Given the choice, we think the extra capacity will be more useful, as it will allow more games to be installed on the SSD rather than the hard drive and cut down on loading times. A 24x speed DVD burner is also included as standard.

At the heart of the system is an Asus Z170-P motherboard, which supports M.2 and USB 3.1, as well as providing an extra pair of PCI slots, not present on the mATX board found in Chillblast's system. It also has an illuminated audio section on the motherboard, which provides a little extra interest when viewed through the side panel. You also get customisable fan control and a host of overclocking options, which should enable to you to increase performance beyond the provided 4.2GHz if you feel the need.

The Eclipse comes with 16GB of the fastest DDR4 memory of the whole group, but there's no getting away from it, the performance of the Eclipse SuperNova i566n9700C isn't exactly spectacular. The PCMark 8.0 Home score of 4574 points is particularly low, although it does pick up in other tests. More importantly though, gaming frame rates are only 1- to 2fps behind the fastest systems, so not something you'd notice outside of benchmarking.

You can add a 26in 1080p display for an extra £100, but you could change this for a 2560x1440 resolution monitor and still have plenty of performance to drive it.

VERDICT: At £899 without the monitor, the Eclipse SuperNova i566n9700C is one of the less expensive Skylake gaming PCs. Its performance lags a little in benchmarks, but it's also more expandable than compact systems such as Chillblast's and has a larger SSD, which cuts down on loading times.

You also get customisable fan control and a host of overclocking options, which should enable to you to increase performance



MESH ELITE SKYLAKE PCA

£999 inc VAT • meshcomputers.co.uk

Build	★★★★★
Features	★★★★½
Performance	★★★★★
Value	★★★★☆
Overall	★★★★½

PC ADVISOR RECOMMENDED

It may not resemble a gaming PC at first glance, but the Mesh Elite Skylake PCA exudes quality. Its tower case comes with a matt black finish that's soft to the touch, giving it an expensive feel. At the top an illuminated display shows the current CPU temperature in a variety of colours, which can be altered at the push of a button.

Unlike most of the gaming PCs we review, the case has no transparent side panel. It's a real shame in this case, because the Mesh Skylake PCA is by far the most impressive-looking inside. The case is spacious, with plenty of available drive bays and the Gigabyte GA-Z170X-Gaming 3 motherboard has attractive red and black details. Most impressive though, is the Raijintek Triton 250mm high performance all-in-one CPU cooler, its two transparent pipes fat and filled with striking blue coolant. There's also a blue downlight that illuminates the desk surface from the bottom of the case.

Performance

Under that fancy cooler lurks an Intel Core-i5 6600K Skylake processor, overclocked from 3.5- to 4.4GHz. This yields a decent boost in performance without pushing components to the absolute limit. It's coupled with 16GB of 2400MHz DDR4 RAM, and comes with a 250GB Samsung SSD backed by a 1TB Seagate hard drive. Although the SSD uses one of the two M.2 ports on the motherboard, it's using the SATA interface rather than PCI-E, so it can't match the raw performance of the Samsung 128GB SM951 used by Chillblast. It does, however, perform very well and its extra capacity may well prove more beneficial than extra speed.

Mesh has opted for the ever-popular nVidia GeForce GTX 970 graphics card, and in this case it's a Palit-branded model running at standard clock speeds, rather than the boosted speeds found in some competitors' systems.

Mesh's chosen motherboard doesn't just look good, it's also designed specifically for gaming, and comes with a selection of features not found on lesser models. Not only does it support USB 3.1, but it also supports USB 3.1 Gen 2, which allows for speeds of up to 10Gb/s and up to a claimed 16Gb/s using Intel's USB 3.1 controller. It also supports both USB Type-C and Type-A connectors.

Audio quality has also been boosted, claiming 115dB signal to noise ratio and featuring support for the Sound Blaster X-Fi MB3 audio suite. The OP-Amp chips have also been made user-upgradable, so if you want the very best sound quality, you can swap them out for higher-fidelity alternatives of your choice.

The board also includes a high-performance 'Killer Ethernet' network interface, designed to reduce latency and improve overall system performance, and is one of the few reviewed here to offer two-way nVidia SLI certification, allowing the addition of an extra GTX 970 as a future upgrade. The supplied 750W power supply also provides plenty of upgrade potential.

The Skylake PCA is a great performer, but not the fastest overall. Chillblast's Fusion Krypton, for example, beats it in the application performance tests, probably due to its faster SSD, and also beats it by a few frames per second in gaming, thanks to its factory overclocked card. The Mesh system does come with double the amount of SSD storage though, which means more games can be installed on it for much faster loading times.

VERDICT: At £999 without a monitor, the Mesh Elite Skylake PCA is one of the most expensive PCs in our group test, but its features and build quality most certainly earn that price tag.



VIBOX SPAWN X

£979 inc VAT • vibox.co.uk

Build	★★★★½
Features	★★★★★
Performance	★★★★★
Value	★★★★☆
Overall	★★★★½

Featuring an Intel Core-i5 6600K processor overclocked to 4.5GHz and speedy 2800MHz DDR4 memory, the Vibox Spawn X offers one of the best core specifications in our Skylake gaming PC group test, but can it's performance live up to the specs?

It's a great-looking system, which combines smart, clean lines with gamer-friendly transparent side windows and a fair smattering of red internal LEDs. The Phanteks Enthoo Pro Mid system case gives a good view of internal components, but has a smart appearance that we feel looks a great deal better than the faux industrial moulding of competing cases such as the Corsair Carbide range.

Processor temperatures are kept in check by an Antec H20 Kühler 650 – a sealed-unit liquid cooler with a 120mm fan and fitted with a blue LED on the impeller unit that lights up when in operation.

The internal design of the case makes it very easy to keep things tidy, thanks to cable management grommets, a separate compartment for the power supply and 3.5in drive bays, which are accessed from the side of the case facing the back of the motherboard. This means almost no cables are visible from the front, but it can be a hassle if you want to lay the PC down flat for maintenance and have access to both the drive bays and the motherboard at the same time. The case also has a huge 200mm front fan and a 140mm fan at the rear. Our review sample also has an additional fan at the top of the case, beneath a meshed roof. The case has a premium 'brushed aluminium' look, but is actually made from plastic. It's a convincing effect though, giving the case rather premium good looks.

Alongside that overclocked CPU, sits an overclocked graphics card, in the form of the MSI GeForce GTX 970 4GD5T OC with its twin-fan cooling system, and a small bump in performance over the standard models.

Storage is provided by a generous 240GB Patriot Blast SSD and a roomy 2TB hard drive, giving the Vibox the largest overall storage capacity of this group test, albeit at slightly lower performance levels than the fastest models available, based on PCI-Express technology.

All of these components should add up to one the fastest Skylake gaming PCs, but while the Vibox Spawn X does well, it's not right at the top of the pile. Both Chillblast and Wired2Fire manage to pull ahead by a small margin in several tests – not so much that you would notice the difference, but don't be fooled into thinking that because the Spawn X is clocked at 4.5GHz rather than 4.4GHz you'll be getting a noticeable increase in performance.

We're pleased to see Vibox using a dedicated gaming motherboard in this system in the form of the MSI Z170A Gaming Pro. This offers both performance and cosmetic enhancements over comparable budget motherboards, including upgraded networking hardware ,which can give network priority to games over other applications, higher-quality audio components and even colour-changing LEDs you can control from an app. You also get USB 3.1 Gen 2 support, and a host of diagnostic and overclocking options. Additionally, the board is SLI certified, so you can add a second GTX 970 graphics card later on if you wish.

The system also includes a Wireless-N adaptor and comes with an internal 24x DVD±RW drive, should you still have a use for such technology.

VERDICT: The Vibox Spawn X is a very good-looking PC, with an impressive specification and the fastest CPU overclock in our group test. It offers a fully-featured gaming motherboard and has a case with excellent cable management and flexible lighting options. It's no slouch, but we would have hoped for even more performance.



WIRED2FIRE DIABLO SKYLAKE

£899 inc VAT • wired2fire.co.uk

Build	★★★★½
Features	★★★★☆
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PC ADVISOR RECOMMENDED

The imposing, angular frame of the Wired2Fire Diablo Skylake immediately sets it apart from the competition. With a distinctive ridged top panel illuminated in blue and scarcely a straight edge to be seen, the sweeping curves and bulging protrusions of the hefty Zalman Z11 Neo case convey power and style – perfect for a modern gaming PC.

The Diablo Skylake is also based on the Intel Core-i5 6600K processor, overclocked from 3.5- to 4.4GHz and fitted with 16GB of 2400MHz DDR4 RAM. Graphics performance comes from an Overclocked MSI GeForce GTX 970 graphics card identical to those used by both Chillblast and Vibox in their Skylake systems, featuring boosted performance and an enhanced cooling system driven by a pair of twin fans.

The processor is air-cooled by a Prolimatech Basic 68 heatsink and 128mm fan combo, while the case itself features additional cooling fans at the front, back and top of the case. The first and last of which light up with a cool blue glow.

Storage comes from a 250GB crucial BX100 SSD and a 1TB hard drive. Both pretty standard fare for a PC at this price point. However, what's not so standard is the performance. The Diablo Skylake may not be clocked as fast as the Vibox Spawn X, but this system still manages to edge ahead of the competition in many tests, including the Vibox PC.

Performance

Chillblast's Fusion Krypton offers faster storage, but there's less available than on the Diablo Skylake, which proves itself to be an excellent all-round performer with a great balance of features.

The system uses an Asus Z170-P motherboard, the same as that found in Eclipse's SuperNova i566n9700Cm, though Wired2Fire's system is noticeably faster . The motherboard doesn't provide as many features as dedicated gaming boards such as the MSI Z170A Gaming Pro or Gigabyte GA-Z170X-Gaming 3, but key features including USB 3.1 Type-C and M.2 support are present and correct. You also miss out on SLI certification, which is not ideal if you were thinking of adding a second graphics card later and an upgrade. Speaking of upgrades, the power supply included in this system is a little on the weak side, at 500W. The power draw remained comfortably under 295W during our stress tests, but if you think that you might go crazy with internal upgrades in the future, this could be something to watch out for.

For an extra £100, you can have an Asus VS247HR 1080p display, which is a good match for the PC, though the graphics card could drive a higher-resolution model if you prefer. We wouldn't suggest trying 4K with this level of graphics card, but a 2560x1440 monitor would be perfect, depending on your budget.

VERDICT: The Wired2Fire Diablo Skylake is an excellent performer, combining an overclocked graphics card with a decent CPU overclock up to 4.4GHz. It comes with a 250GB SSD, big enough to hold your most important apps and comes in an impressive system case. It offers great value for money, but if you like to tinker, you may prefer to go for something with a proper gaming motherboard.

The sweeping curves and bulging protrusions of the hefty Zalman Z11 Neo case convey power and style – perfect for a gaming PC



Conclusion

If you want a compact system, then Chillblast's PC is an excellent choice. It delivers superb performance, with good features and an excellent warranty

While all of the Skylake PCs reviewed here are based on the Intel Core-i5 6600K processor, and all but one pair that with an nVidia GeForce GTX 970 graphics card, there is still plenty of scope for choice. Differences in performance aren't huge, but there are larger differences in features and aesthetics.

If you want a compact system, then Chillblast's Fusion Krypton is an excellent choice. It delivers superb performance, with good features and an excellent warranty, though its smaller size can limit the scope for tinkering inside. It offers super-fast PCI-Express storage, but at 128GB there's possibly not enough of it. It's the cheapest PC here and has the best warranty, so stump up for a bigger SSD if you can afford it.

If you're looking for a bargain, then both Eclipse and Wired2Fire have systems available for under £900 if you exclude the monitor. Of the two systems, we would have to pick the Wired2Fire Diablo Skylake, which performed much better in our tests and looks more impressive on the desktop. It also comes with a slightly faster graphics card.

Moving up the price scale a little brings us to the Vibox Spawn X, another excellent choice, which combines great performance with some of the best gaming features, thanks to its gaming-centric motherboard. It also offers the fastest CPU overclock, but don't be fooled into thinking that necessarily makes it the fastest PC

The most expensive systems come from Cyberpower and Mesh. We favour the latter as the build quality is much higher and the illuminated temperature readout looks great. Even the internal components you can't see look better than those of any of the PCs with side windows. There's a version of the case with a window available, so by all means request one of those and show it off. The Mesh system also features a gaming motherboard – if only the graphics card had been an overclocked model.

These PCs are all very close in specification, so of our favourite three, we suggest you pick the model that best fits your budget, they're all great systems with different things going for them.

How we test

To test general PC performance, we're use Futuremark's PCMark 8 v2.0 benchmarking suite. Unlike the previous PCMark 7 benchmark, the new version doesn't produce a single overall figure. Instead, results are divided into Home, Creative, Work and Storage tests. The Home benchmark reflects common tasks for typical home use with lower computing requirements, such as web browsing, photo editing and low-end gaming.

The Creative benchmark is aimed more at enthusiasts and professionals working with multimedia and entertainment content. It is more demanding on the processor and includes transcoding tests as well as further gaming workloads.

The Work test is geared towards office work tasks such as creating documents, web browsing, spreadsheets and video conferencing. It does not stress the gaming and multimedia capabilities of the PCs.

Gaming performance

We've used three games to evaluate graphics performance. We run our tests at 1280x720- and 1920x1080 pixels at various detail settings. Framerates are recorded using the following games and quality settings. Final Fantasy XIV: 1920x1080, Maximum quality. Alien vs Predator: 1280x720, all settings at Maximum quality; 1920x1080, all settings at Maximum quality. Sniper Elite V2: 1280x720, all options set to Low quality, advanced shadows off, Supersampling off; 1920x1080, All options set to Medium quality, advanced shadows off, Supersampling off; 1920x080, all options set to Ultra quality, Advanced shadows – high, 4x Supersampling.

We also run Futuremark's 3DMark suite of benchmarks to help evaluate gaming performance in eight different usage scenarios. With these results, we can get a good idea of the level of quality and display resolutions a given PC can run acceptably. In this group test, the scores are all very close, due to the similar hardware used. Results are given in points and higher numbers are better.

Power consumption torture testing

We measure the power consumption of each PC base unit when idle, and again while running at its performance limit. During the idle test, the PCs hard drives are still spinning and the power-management features are not enabled. For the full-load torture test, we run Prime 95 to force all CPU processing threads to maximum utilisation and stress system memory. At the same time we run the Geeks3D Furmark benchmark to stress any installed graphics cards. We leave these tests running for 10 minutes, then record the power consumption and the maximum CPU core temperature reached. Power consumption will increase with performance, and overclocking will require significantly more power. Greater power usage also required better cooling, and these test allow us to verify that the installed cooling systems are up to the task of keeping temperatures within safe limits.

Overclocking

Because gamers demand the best performance from their hardware, we allow vendors to overclock PCs in this category. We require that the PC vendor offers a comprehensive warranty covering the overclocked system. Be aware that if you overclock the PC yourself, you may invalidate your warranty.

Subjective assessment

We pay close attention to the physical characteristics of each PC, its noise output and its build quality, delving inside the case and taking note of the quality of components used, cabling and airflow.

Support

Differences in warranty terms can impact our scoring. Long warranties are sought after, but we also look at the terms and conditions – specifically, whether faulty PCs must be returned to the vendor at your cost, and if both parts and labour are included. ☒

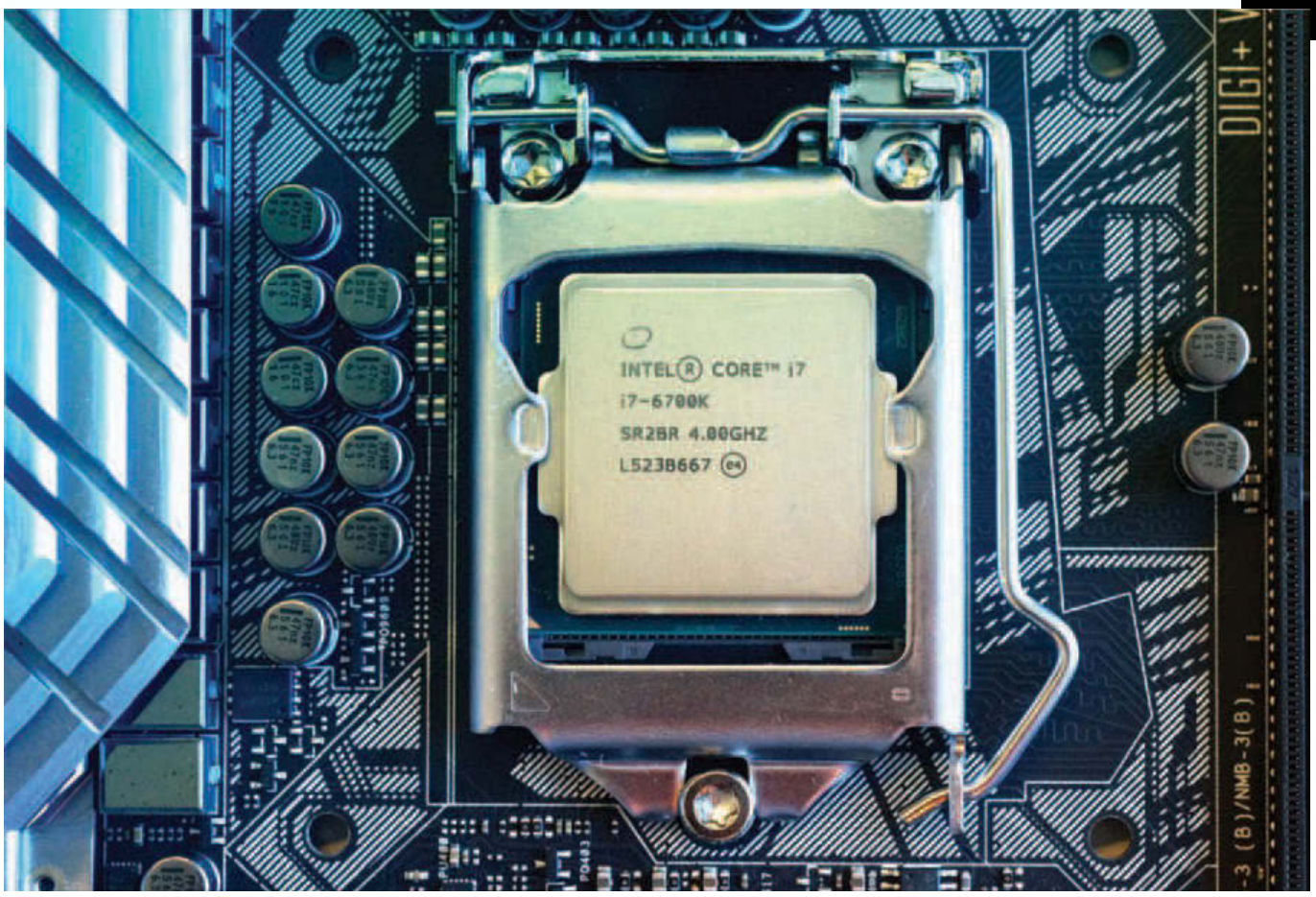
	CHILLBLAST £869 (inc VAT & delivery) PC ADVISOR RECOMMENDED	CYBERPOWER £999 inc VAT (inc VAT & delivery)	ECLIPSE £899 (inc VAT & delivery)	
Product name	Fusion Krypton	Infinity X55 SE	SuperNova i566n9700C	
Processor	3.5GHz Intel Core i5-6600K (4.2GHz)	3.5GHz Intel Core i5-6600K (4.2GHz)	3.5GHz Intel Core i5-6600K (4.2GHz)	
CPU Cooler	Zalman CNPS11X Performa	Corsair Hydro H55	Zalman CNPS11X Performa	
Installed memory	16GB DDR4 2133MHz	8GB DDR4 2133MHz Hyper x Fury	16GB DDR4 Corsair Vengeance LPX, 3000MHz	
Storage	128GB Samsung SM951 M2 SSD, 2000GB Seagate 7200rpm HDD	Seagate 1TB Sata III HDD, Kingston V300 120GB SSD	240GB Kingston HyperX Fury SSD, 1TB Seagate Barracuda HDD	
Power supply	Aerocool Integrator 600W	Corsair 750W Builder Series	Corsair VS series 550W	
Motherboard	Asus Z170M-PLUS	Gigabyte Z170-HD3	Asus Z170-P	
Operating system	Windows 10 Home	Windows 10 Home	Windows 10 Home	
Display	28in AOC U2868Pqu: 3840x2160, 1ms, VGA, DVI-D, HDMI, DP	None	26in HKC 2615: 1920x1080, TN, HDMI, VGA	
Graphics card	MSI nVidia GeForce GTX 970 (4GB)	VTX3D AMD Radeon R9 390 (8GB)	Palit nVidia GeForce GTX 970 (4GB)	
Sound card	Onboard	Onboard	Onboard	
Networking	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	
External USB ports	USB 3.1 type-C, 3x USB 3.0, 4x USB 2.0	5 x USB 3.0, 3x USB 2.0	USB 3.1 Type-C, 3x USB 3.0, 3x USB 2.0	
Other ports	2x DVI, HDMI, DP, 2x PS2	HDMI, DP, 2x DVI	DVI, HDMI, 3x DP	
Optical drive	Optional: 24-speed DVD (£19.99); Blu-ray RW (£69.99)	Samsung DVD±RW 24x SH-224FB/BEBE	Samsung SH-224FB 24x DVD+/-R	
Case	Chillblast Kube Case	Corsair Carbide SPEC-01	Corsair Carbide Spec-03	
Keyboard and mouse	Thermaltake E-Sports Commander Gaming	Coolermaster Devastator	Thermaltake E-Sports Commander Gaming	
Extra items	None	Blue LED strip	None	
Warranty	5 years: first 2 years collect, return, parts and labour; remaining 3 years labour	3 years labour, 2 years parts, 30 days collect and return	3- years RTB, 1 year parts, 30-day collect and repair	
PERFORMANCE				
PCMark 8 2.0 Home	5332	5233	4575	
PCMark 8 2.0 Work	5744	5557	5112	
PCMark 8 2.0 Creative	7548	6938	6594	
PCMark 8 2.0 Storage	5085	4803	4884	
Alien vs Predator (fps) 1080	90.7	106	88.8	
Alien vs Predator (fps) 720	173.4	190.2	170.3	
Sniper Elite V2 (fps) Ultra	49.2/36.9	42.4/33.8	47.7/34.3	
Sniper Elite V2 (fps) Medium	201.8/106.1	169.3/146.3	203.9/117.3	
Sniper Elite V2 (fps) Low	459.6/91.3	413.1/265.5	356.4/133.3	
Final Fantasy XIV Creation Benchmark (fps) Maximum	134.6	135.4	128.3	
Max CPU temperature under load (C°)	70	67	68	
Power Consumption idle/load (W)[1]	55/303	73/520	51/264	

[1] Measured when idle and under load respectively

	MESH £999 (inc VAT & delivery) 4.5 stars PC ADVISOR RECOMMENDED	VIBOX £979 (inc VAT & delivery) 4.5 stars	WIRED2FIRE £899 (inc VAT & delivery) 5 stars PC ADVISOR RECOMMENDED
	Elite Skylake PCA	Spawn X	Diablo Skylake
	3.5GHz Intel Core i5-6600K (4.4GHz)	3.5GHz Intel Core i5-6600K (4.5GHz)	3.5GHz Intel Core i5-6600K (4.4GHz)
	Raijintek Triton 240mm high-performance AIO water cooling solution: blue coolant	Antec H20 Kühler 650	Prolimatech Basic 68
	16GB DDR 2400MHz	8GB Patriot Viper Xtreme 2800MHz	16GB DDR4 2400MHz 2 x 8GB sticks
	250GB Samsung M2 SSD, 1TB seagate SATA 3 HDD	240GB Patriot Blast SSD, 2TB Mechanical Hard Drive	250GB Crucial BX100 SSD, Seagate 1TB Barracuda
	FSP QuietPower 750W	Superflower HX650 650W	FSP 500W
	GIGABYTE GA_Z170X-Gaming 3	MSI Z170A Gaming Pro	Asus Z170-P
	Windows 10 Home	Windows 10 Home	Windows 10 Home
	None	None	Asus VS247HR: 1920x1080 HDMI, TN, VGA, DVI-D
	Palit nVidia GeForce GTX 970 (4GB)	MSI nVidia Geforce GTX 970 (4GB)	MSI nVidia Geforce GTX 970 (4GB)
	Onboard	Onboard	Onboard
	Killer Lan 2200 Gigabit ethernet	Intel i219-V Gigabit, 300MB/s Wi-Fi adaptor	Gigabit ethernet
	3x USB 3.0, 2x USB 2.0, USB 3.1 Typ-A, USB 3.1 Type-C	6x USB 3.1 Gen1, 2x USB 3.1 Gen2, 6x USB 2.0	USB 3.1 Type-C, 4x USB 3.0, 4x USB 2.0
	D-Sub, DVI-D, HDMI	HDMI, DVI	PS/2 Keyboard, PS/2 Mouse, 3x audio, VGA, DVI, HDMI,
	24x DVD Writer (read/write CD and DVD)	Internal 24x DVD±RW Drive	DVD rewriter
	Aero Cool DS 200	Phanteks Enthoo Pro Mid – Black with Window	Zalman Z11 Neo
	ROCCAT ISKU keyboard (ROC-12-722), ROCCAT Lua mouse (ROC-11-310)	Coolermaster Devastator (extra £20)	Coolermaster Devastator
	None	None	None
	Gold warranty: lifetime labour; 2 years parts; 1-year free collect and return	Vibox Evolution lifetime warranty	3 years: 2 years parts; 3 years labour
	5316	5327	5434
	5748	5695	5719
	7282	7432	8314
	4996	4828	4965
	89.6	89.8	90.1
	169.6	169.7	172.6
	47.6/34.8	49/35.1	49/35.4
	203.2/96.6	205.9/116.6	208.5/93.7
	444.7/221.7	447.3/188.6	461.4/88.9
	130.4	132.8	133.2
	51	Not tested	65
	63/251	Not tested	57/295

INTEL SKYLAKE:

All the speeds, feeds and prices, and which one is right for you



We look at Skylake's 48 new CPUs, from mobile versions to beefy overclockers. Mark Hachman reports

Trying to figure out which sixth-generation Intel Core chip to buy in Intel's Skylake family is like going to a preseason football match: there are numbers everywhere. Somewhere in the crowd are the superstars. But which ones?

We can't test everything at *PC Advisor*, but what we can do is provide a handy guide of the Skylake chips Intel launched at the IFA show in Berlin in early September.

The prices Intel has published appear to be on a par with those it charges for its Broadwell chips – meaning that, from a price perspective, it's a no-brainer to bypass Broadwell or Haswell for Skylake. There is, however, a catch for desktop users: Skylake uses a new motherboard socket and memory, so you'll practically have to invest in a new system.

For laptop users, Skylake hits a new, lower, power threshold, so your portable's battery should theoretically last a bit longer.

Intel announced five families of microprocessors: four for the Core family, as well as new Core m designations for the i3, i5 and i7. If you're buying an Intel-based tablet, the chances are it will include a Core Y-series chip. Thin-and-light notebooks will use the U-series chips. So-called 'ultimate mobile' systems and performance workstations will include the H-series chips, while the S-series chips will be included in both performance and value desktops, all-in-ones and mini PCs.

A quick guide to the charts

We've included Intel's processor charts throughout this article. Over the years, the metrics the chipmaker uses to describe its processors. Price, clock speed and the number of cores still remain as the primary metrics. Just note that the dollar price Intel is quoting is for a bulk order in lots of 1,000. You'll typically pay more for an individual chip from a retailer.

Handy tip: Almost all sixth-generation Core chips – the Skylake family – use a 6 as the first number of their product name, such as the i5-6500T.

Modern operating systems such as Windows 10 are better at dividing up tasks among the multiple cores that most processors include, so a greater number of cores and threads generally translates into improved performance. If necessary, those cores can kick into 'turbo mode', temporarily overclocking themselves to complete a task quickly. Core i3 chips lack this capability.

Consumers shouldn't have to worry about Intel's Stable Image Platform (SIPP) or Small Business Advantage (SBA) technologies. The same goes for Intel vPro. You might want to consider buying a chip with Intel TXT technology built in, however; that's the Trusted eXecution Environment, which seems to be at the heart of new Windows technologies such as Passport. Almost all of the new Skylake chips include virtualisation technology – a geeky way to test out a future

Modern operating systems such as Windows 10 are better at dividing up tasks among the multiple cores that most processors include, so a greater number of cores and threads generally translates into improved performance

version of Windows 10, but essential if you want to run Android apps on your PC.

Note: Not everything Intel announced will be immediately available. If the price is listed as To Be Determined (TBD), Intel will ship it at a later date – either during the fourth quarter or in early 2016.

High-end desktops: the S series

While Intel hasn't announced any of its high-end 'Extreme Edition' parts yet, the first thing that should strike you is the overall reduction in power.

An Intel 4GHz Core i7-4790K Haswell CPU, for example, is rated to dissipate 88W of heat. Its direct replacement is the 4GHz Core i7-6700K, which has a 'TDP' rating of 91W. Both of these CPUs are designed for enthusiasts who will overclock.

The better comparison would be the 3.6GHz Core i7-4790 chip, which doesn't overclock. Even with its lower clock speeds, it maintains the same TDP rating of 84W. For Skylake, the 3.4GHz Core i7-6700 that can't be overclocked has a TDP rating of 65W. To be fair to Haswell, there was a Core i7-4790S version with the same TDP rating as its Skylake counterpart, but the clocks drop even lower, to 3.2GHz.

Even though Skylake represents a processor redesign and not a process shrink – where most of the power reduction takes place – Skylake should consume less power than a similar Haswell chip.

Intel's high-end Skylake desktop line-up

6th Gen Intel® Core™ Desktop Processor SKU Detail (91W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	DDR4 Memory Speed Support (MHz)	DDR3L Memory Speed Support (MHz)	L3 Cache	TDP[1]	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (S-Processor Line)																					
i7-6700K	4/8	4.0	4.2	4.0	4.0	Intel® HD graphics 530	350/1150	2133	1600	8M	91W	100	2015	✓			✓	✓	✓	LGA	BOX: $350.00 TRAY: $339.00
Intel® Core™ i5 Processors (S-Processor Line)																					
i5-6600K	4/4	3.5	3.9	3.8	3.6	Intel® HD graphics 530	350/1150	2133	1600	6M	91W	100	2015	✓			✓	✓	✓	LGA	BOX: $243.00 TRAY: $242.00

6th Gen Intel® Core™ Desktop Processor SKU Detail (65W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	DDR4 Memory Speed Support (MHz)	DDR3L Memory Speed Support (MHz)	L3 Cache	TDP[1]	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (S-Processor Line)																					
i7-6700	4/8	3.4	4.0	3.9	3.7	Intel® HD graphics 530	350/1150	2133	1600	8M	65W	100	2015	✓	✓	✓	✓	✓	✓	LGA	BOX: $312.00 TRAY: $303.00
Intel® Core™ i5 Processors (S-Processor Line)																					
i5-6600	4/4	3.3	3.9	3.8	3.6	Intel® HD graphics 530	350/1150	2133	1600	6M	65W	100	2015	✓	✓	✓	✓	✓	✓	LGA	BOX: $224.00 TRAY: $213.00
i5-6500	4/4	3.2	3.6	3.5	3.3	Intel® HD graphics 530	350/1050	2133	1600	6M	65W	100	2015	✓	✓	✓	✓	✓	✓	LGA	BOX: $202.00 TRAY: $192.00
i5-6400	4/4	2.7	3.3	3.3	3.1	Intel® HD graphics 530	350/950	2133	1600	6M	65W	100	2015	✓			✓	✓	✓	LGA	BOX: $187.00 TRAY: $182.00
Intel® Core™ i3 Processors (S-Processor Line)																					
i3-6320	2/4	3.9	N/A	N/A	NA	Intel® HD graphics 530	350/1150	2133	1600	4M	47W	100		✓			✓	✓	✓	LGA	BOX: $157.00 TRAY: $149.00
i3-6300	2/4	3.8	N/A	N/A	NA	Intel® HD graphics 530	350/1150	2133	1600	4M	47W	100		✓			✓	✓	✓	LGA	BOX: $147.00 TRAY: $138.00
i3-6100	2/4	3.7	N/A	N/A	NA	Intel® HD graphics 530	350/1050	2133	1600	3M	47W	100		✓			✓	✓	✓	LGA	BOX: $117.00 TRAY: $117.00

6th Gen Intel® Core™ Desktop Processor SKU Detail (35W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	DDR4 Memory Speed Support (MHz)	DDR3L Memory Speed Support (MHz)	L3 Cache	TDP[1]	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (S-Processor Line)																					
i7-6700T	4/8	2.8	3.6	3.5	3.4	Intel® HD graphics 530	350/1100	2133	1600	8M	35W	100	2015	✓	✓	✓	✓	✓	✓	LGA	TRAY: $303.00
Intel® Core™ i5 Processors (S-Processor Line)																					
i5-6600T	4/4	2.7	3.5	3.4	3.3	Intel® HD graphics 530	350/1100	2133	1600	6M	35W	100	2015	✓	✓	✓	✓	✓	✓	LGA	TRAY: $213.00
i5-6500T	4/4	2.5	3.1	3.0	2.8	Intel® HD graphics 530	350/1100	2133	1600	6M	35W	100	2015	✓	✓	✓	✓	✓	✓	LGA	TRAY: $192.00
i5-6400T	4/4	2.2	2.8	2.7	2.5	Intel® HD graphics 530	350/950	2133	1600	6M	35W	100		✓			✓	✓	✓	LGA	TRAY: $182.00
Intel® Core™ i3 Processors (S-Processor Line)																					
i3-6300T	2/4	3.3	N/A	N/A	NA	Intel® HD graphics 530	350/950	2133	1600	4M	35W	100		✓			✓	✓	✓	LGA	TRAY: $138.00
i3-6100T	2/4	3.2	N/A	N/A	NA	Intel® HD graphics 530	350/950	2133	1600	3M	35W	100		✓			✓	✓	✓	LGA	TRAY: $117.00

The other thing to notice is that, at least for now, all of the desktop chips that Intel has announced have at most four cores and eight threads. Intel's Core i7-5820K and higher 'Haswell-E' chips that use larger sockets and don't contain integrated graphics all contain six cores and 12 threads. It's not clear whether Intel plans to add similar parts in the future, or leave a four-core/eight-thread as the high end in the smaller socket.

What does seem clear, though, is that there are only single Core i5 and i7 unlocked 'K' versions of the Skylake parts; it's virtually assured that more will be added over time.

From a graphics perspective, the desktop chips are virtually identical: they all use the new Intel HD Graphics 530 core. Just be aware that some of the slower chips – the i5-6400, specifically – have their graphics cores clocked lower under load. Still to come are Intel's Skylake chips using embedded DRAM, which should greatly increase graphics performance.

The desktop Pentium chips

Intel resurrected the Pentium brand awhile back, a throwback to the days when gamers had to tweak HIMEM.SYS and other system files to allow their PCs to work. Today, a Pentium chip is synonymous with low cost. Intel will also launch Celeron versions of Skylake, at an even cheaper price.

You can see that buying a Pentium chip isn't that bad of a deal for basic computing. Here's the interesting thing, though: because there's no Turbo Boost self-overclocking mode, the Pentiums are clocked faster than some of their Core cousins. Couple that with a pared-down cache to save cost, and the result is a cheap processor that's going to run at full speed aggressively. The only caveat is the lack of Hyper-Threading, which is Intel's virtual CPU technology that makes two CPU cores act like four. Depending on what you do though, you may not notice it.

And no, cheap gamers, we asked: Intel said none of the new Skylake Pentiums

6th Gen Intel® Core™ Desktop Processor SKU Detail (65W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	DDR4 Memory Speed Support (MHz)	DDR3L Memory Speed Support (MHz)	L3 Cache	TDP[1]	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Pentium® Processors (S-Processor Line)																					
G4520	2/2	3.6	N/A	N/A	NA	Intel® HD graphics 530	350/1050	2133	1600	3M	47W	100					✓	✓	✓	LGA	BOX: $93.00 TRAY: $86.00
G4500	2/2	3.5	N/A	N/A	NA	Intel® HD graphics 530	350/1050	2133	1600	3M	47W	100					✓	✓	✓	LGA	BOX: $82.00 TRAY: $75.00
G4400	2.2	3.4	N/A	N/A	NA	Intel® HD graphics 510	350/1050	2133	1600	3M	47W	100					✓	✓	✓	LGA	BOX: $64.00 TRAY: $64.00

6th Gen Intel® Core™ Desktop Processor SKU Detail (35W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	DDR4 Memory Speed Support (MHz)	DDR3L Memory Speed Support (MHz)	L3 Cache	TDP[1]	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Pentium® Processors (S-Processor Line)																					
G4500T	2/2	3.0	N/A	N/A	NA	Intel® HD graphics 530	350/950	2133	1600	3M	35W	100					✓	✓	✓	LGA	TRAY: $75.00
G4400T	2/2	2.9	N/A	N/A	NA	Intel® HD graphics 510	350/950	2133	1600	3M	35W	100					✓	✓	✓	LGA	TRAY: $64.00

Intel® Xeon® Mobile Processor SKU Detail (45W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 Memory Speed Support (MHz)	DDR3L/ DDR4 Memory Speed Support (MHz)	L3 Cache	TDP	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Xeon® Processors (H-Processor Line)																					
E3-1535M v5	4/8	2.9	3.8	3.6	3.4	Intel® HD graphics P530	350/1050	1866	1600/ 2133	8M	45W	100	2015	✓	✓	✓	✓	✓	✓	BGA	$623
E3-1505M v5	4/8	2.8	3.7	3.5	3.3	Intel® HD graphics P530	350/1050	1866	1600/ 2133	8M	45W	100	2015	✓	✓	✓	✓	✓	✓	BGA	$434

6th Gen Intel® Core™ Mobile Processor SKU Detail (45W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 Memory Speed Support (MHz)	DDR3L/ DDR4 Memory Speed Support (MHz)	L3 Cache	TDP	Tj (deg)	Intel® SIPP	Intel® SBA	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (H-Processor Line)																					
i7-6920HQ	4/8	2.9	3.8	3.6	3.4	Intel® HD graphics 530	350/1050	1866	1600/ 2133	8M	45W	100	2015	✓	✓	✓	✓	✓	✓	BGA	$568
i7-6820HQ	4/8	2.7	3.6	3.4	3.2	Intel® HD graphics 530	350/1050	1866	1600/ 2133	8M	45W	100	2015	✓	✓	✓	✓	✓	✓	BGA	$378
i7-6820HK	4/8	2.7	3.6	3.4	3.2	Intel® HD graphics 530	350/1050	1866	1600/ 2133	8M	45W	100		✓			✓	✓	✓	BGA	$378
i7-6700HQ	4/8	2.6	3.5	3.3	3.1	Intel® HD graphics 530	350/1050	1866	1600/ 2133	6M	45W	100		✓			✓	✓	✓	BGA	$378
Intel® Core™ i5 Processors (H-Processor Line)																					
i5-6440HQ	4/4	2.6	3.5	3.3	3.1	Intel® HD graphics 530	350/950	1866	1600/ 2133	6M	45W	100	2015	✓	✓	✓	✓	✓	✓	BGA	$250
i5-6300HQ	4/4	2.3	3.2	3.0	2.8	Intel® HD graphics 530	350/950	1866	1600/ 2133	6M	45W	100		✓			✓	✓	✓	BGA	$250
Intel® Core™ i3 Processors (H-Processor Line)																					
i3-6100H	2/4	2.7	2.7	2.7	NA	Intel® HD graphics 530	350/900	1866	1600/ 2133	3M	35W	100		✓			✓	✓	✓	BGA	$225

Intel's mobile Skylake chips include the intriguing mobile Xeon and an overclockable Core i7

support overclocking, like it did with the 'Anniversary Edition' Pentium G3258.

Intel can't shave as much power in the mobile space, where the maximum thermal power of a Broadwell chip, 47W, is nearly identical to the 45W that a mobile Skylake processor consumes. Here, though, Intel is focusing on the time in which the chip needs to be powered up. Intel's Skylake-specific Speed Shift feature reduces the time in which a chip needs to shift from a high- to a low-power sleep state to as little as 1ms, versus 30ms or so before. This sounds like a tiny detail, but when the chip is constantly shifting from a full-power 'busy' state to a sleep state, it's a big deal.

One of the oddities of the new mobile Skylake line is the new mobile Xeon 'server' processor, designed for true mobile workstations. Intel has already begun

6th Gen Intel® Core™ Mobile Processor SKU Detail (28W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 Memory Speed Support (MHz)	DDR3L/ DDR4 Memory Speed Support (MHz)	L3 Cache	TDP	cTDP Down	Tj (deg)	Intel SIPP	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (U-Processor Line)																					
i7-6567U	2/4	3.3	3.6	3.4	N/A	Intel® Iris™ Graphics 550	300/1100	1866	1600/ 2133	4MB	28W	23W	100				✓	✓	✓	BGA	TBD
Intel® Core™ i5 Processors (U-Processor Line)																					
i5-6287U	2/4	3.1	3.5	3.3	N/A	Intel® Iris™ Graphics 550	300/1100	1866	1600/ 2133	4MB	28W	23W	100				✓	✓	✓	BGA	TBD
i5-6267U	2/4	2.9	3.3	3.1	N/A	Intel® Iris™ Graphics 550	300/1050	1866	1600/ 2133	4MB	28W	23W	100				✓	✓	✓	BGA	TBD
Intel® Core™ i3 Processors (U-Processor Line)																					
i3-6167U	2/4	2.7	N/A	N/A	N/A	Intel® Iris™ Graphics 550	300/1000	1866	1600/ 2133	3MB	28W	23W	100				✓	✓	✓	BGA	TBD

6th Gen Intel® Core™ Mobile Processor SKU Detail (15W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 Memory Speed Support (MHz)	DDR3L/ DDR4 Memory Speed Support (MHz)	L3 Cache	TDP	cTDP Down	Tj (deg)	Intel SIPP	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i7 Processors (U-Processor Line)																					
i7-6650U	2/4	2.2	3.4	3.2	N/A	Intel® Iris™ Graphics 540	300/1050	1866	1600/ 2133	4MB	15W	9.5W	100	2016	✓	✓	✓	✓	✓	BGA	TBD
i7-6600U	2/4	2.6	3.4	3.2	N/A	Intel® HD graphics 520	300/1050	1866	1600/ 2133	4MB	15W	7.5W	100	2016	✓	✓	✓	✓	✓	BGA	$393
i7-6560U	2/4	2.2	3.2	3.1	N/A	Intel® Iris™ Graphics 540	300/1050	1866	1600/ 2133	4MB	15W	9.5W	100				✓	✓	✓	BGA	TBD
i7-6500U	2/4	2.5	3.1	3.0	N/A	Intel® HD graphics 520	300/1050	1866	1600/ 2133	4MB	15W	7.5W	100				✓	✓	✓	BGA	$393
Intel® Core™ i5 Processors (U-Processor Line)																					
i5-6360U	2/4	2.0	3.1	2.9	N/A	Intel® Iris™ Graphics 540	300/1000	1866	1600/ 2133	4MB	15W	9.5W	100	2016	✓	✓	✓	✓	✓	BGA	TBD
i5-6300U	2/4	2.4	3.0	2.9	N/A	Intel® HD graphics 520	300/1000	1866	1600/ 2133	3MB	15W	7.5W	100	2016	✓	✓	✓	✓	✓	BGA	$281
i5-6260U	2/4	1.8	2.9	2.7	N/A	Intel® Iris™ Graphics 540	300/950	1866	1600/ 2133	4MB	15W	9.5W	100				✓	✓	✓	BGA	TBD
i5-6200U	2/4	2.3	2.8	2.7	N/A	Intel® HD graphics 520	300/1000	1866	1600/ 2133	3MB	15W	7.5W	100				✓	✓	✓	BGA	$281

6th Gen Intel® Core™ Mobile Processor SKU Detail (15W)

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 Memory Speed Support (MHz)	DDR3L/ DDR4 Memory Speed Support (MHz)	L3 Cache	TDP	cTDP Down	Tj (deg)	Intel SIPP	Intel Technologies					Package Type	1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)										Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI		
Intel® Core™ i3 Processors (U-Processor Line)																					
i3-6100U	2/4	2.3	N/A	N/A	N/A	Intel® HD graphics 520	300/1000	1866	1600/ 2133	3MB	15W	7.5W	100				✓	✓	✓	BGA	$281
Intel® Pentium® Processors (U-Processor Line)																					
4405U	2/4	2.1	N/A	N/A	N/A	Intel® HD graphics 510	300/950	1866	1600/ 2133	2MB	15W	10W	100				✓	✓	✓	BGA	TBD

All of the 15W Skylake variants prove that Intel believes in the ultrabook market

shipping the chip – at the SigGraph show in August, Lenovo announced the P50 (pictured opposite) and P70 workstations, including the chip, as well as peripheral enhancements like Thunderbolt 3.0, based on the new Intel Alpine Ridge controller.

Gamers, though, may want to think about the Core i7-6820HK. Why? Because it carries that magical K suffix, meaning that it's overclockable. At the Intel Developer Forum, Intel executives said we'd be seeing laptops with a simple, one-touch overclocking mode by way of a 'turbo' button.

In general, though, Intel's mobile chips show a definite progression down the performance curve: the more expensive Core i7s boast larger cache, robust Turbo Modes, and a faster maximum graphics clock speed. All of these factors decline as the processors step down into the Core i5 and Core i3 range.

Be aware that Intel also has two other line-ups of Core i7/i5/i3 for ultrabook PCs consuming 28- and 15W. In general, yo should expect lower performance but longer battery life with these chips. Because laptops in general are getting thinner, might not be totally clear whether you're buying an 'ultrabook' or just a thin laptop.

These lower-power chips differ from the more robust 45W variants in two key ways: the number of cores are significantly reduced. Also, Intel has included what appears to be a down-clocked mode, for activities like simply displaying a web page, for example, that require less exertion from a chip.

You'll also notice two graphics variations: a slightly underclocked version of the HD Graphics included on the 45W chips, as well as an entirely different Iris Graphics architecture. The Iris Graphics brand has generally been used for Intel's premium graphics product, which means the lower-power products may actually outperform the chips with more cores. (But note the TBD designation in the

While the Intel HD Graphics 515 chip is part of the Skylake family, it's bare-bones in terms of performance. Still, the selling point is power: Core m chips run at 4.5W, and Intel says you'll get up to 10 hours of battery life with a Core m tablet



Lenovo ThinkPad P50

pricing column. Iris Graphics is coming later, and Intel's not saying when.)

If you're wondering why, it's likely because higher-wattage quad-cores are almost always coupled with discrete graphics for more performance. The lower-power U-series chips almost always go it alone with integrated graphics. Still to come will be the Iris Pro version, using its own dedicated 64- or 128MB eDRAM frame buffer.

One has to wonder whether, over time, Intel might add a four-core/eight-thread version of the 28W Core i7 chip, as a middle ground for gamers. Eventually, the PCI-SIG hopes to mainstream a technology called Oculink, which lets gamers tote around a low-power laptop by day and connect it to an external GPU for gaming after hours.

The Core m now has its own naming scheme

So-called two-in-one or hybrid devices occupy their own little niche: sometimes they're a tablet, while at others they're a notebook. Now, with Intel's new Skylake Core m chips, you'll have a better sense of what's what.

What surprises us most, however, is the price Intel's charging almost £250 a pop in most cases. That means the Skylake Core m definitely won't be appearing in devices that will compete with Android tablets. For the price of a Core m, you'd be able to buy a decent Android tablet all by itself.

The Core m, however, features both up- and downclocked modes, allowing the tablet to rev up when needed, then clock down when not. (The Core m3 can also enter Turbo Mode, unlike the Core i3.)

While the Intel HD Graphics 515 chip is part of the Skylake family, it's bare-bones in terms of performance. Still, the selling point is power: Core m chips run at just 4.5W, and Intel believes you'll get up to 10 hours of battery life with a Core m tablet.

Know your chips to make the best purchase

If you've read this far, you should have a better idea of what distinguishes which Intel Skylake chip from another. It's useful information, because eventually, you're going to see an ad for a 'Core i7' computer on heavy discount, and you're going to be tempted. You should be able to figure out whether the vendor is selling an older Broadwell chip, or perhaps a low-end Core i3 that isn't what you'll want. Remember, too, that Intel's Skylake is more than just a chip – it's also a collection of technologies designed to revamp the PC.

6th Gen Intel® Core™ m Processor SKU Detail

Processor Number	Cores/ Threads	Base Freq (GHz)	Intel Turbo Boost Technology 2.0			Graphics	Graphics Base / Max Freq (MHz)	LPDDR3 /DDR3L Memory Speed Support (MHz)	L3 Cache	TDP	cTDP Up/ Down	Tj (deg)	SDP	Tj @ SDP (deg)	Intel SIPP	Intel Technologies					1ku Pricing
			Max Single Core Turbo (GHz)	Max Dual Core Turbo (GHz)	Max Quad Core Turbo (GHz)											Intel vPro	Intel TXT	Intel VT-d	Intel VT-x	AES-NI	
Intel® Core™ m7 Processors (Y-Processor Line)																					
6Y75	2/4	1.2	3.1	2.9	N/A	Intel® HD graphics 515	300/1000	1866/ 1600	4MB	4.5W	7W / 3.5W	100	3W	N/A	2016	✓	✓	✓	✓	✓	$393
Intel® Core™ m5 Processors (Y-Processor Line)																					
6Y57	2/4	1.1	2.8	2.4	N/A	Intel® HD graphics 515	300/900	1866/ 1600	4MB	4.5W	7W / 3.5W	100	3W		2016	✓	✓	✓	✓	✓	$281
6Y54	2/4	1.1	2.7	2.4	N/A	Intel® HD graphics 515	300/900	1866/ 1600	4MB	4.5W	7W / 3.5W	100	3W					✓	✓	✓	$281
Intel® Core™ m3 Processors (Y-Processor Line)																					
6Y30	2/4	0.9	2.2	2.0	N/A	Intel® HD graphics 515	300/850	1866/ 1600	4MB	4.5W	7W / 3.8W	100	3W					✓	✓	✓	$281
Intel® Pentium® Processors (Y-Processor Line)																					
4405Y	2/4	1.5	N/A	N/A	N/A	Intel® HD Graphics	300 / 800	1866/ 1600	2MB	6W	N/A/ 4.5W	100	N/A						✓	✓	TBD

THE BEST WEB BROWSER OF 2015

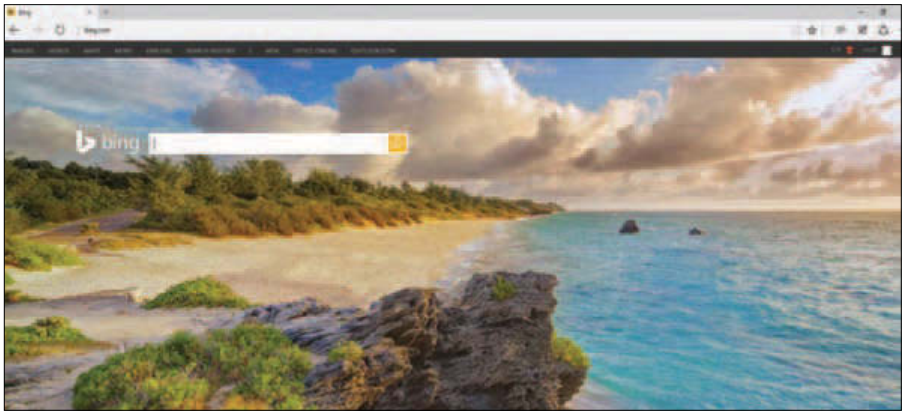
We've tested the top browsers – Google Chrome, Microsoft's Edge and Internet Explorer, Mozilla Firefox and Opera – against a variety of simulated and real-world tests, and picked a winner. By Mark Hachman

The best browsers go beyond benchmarks, racing through real-world web pages, as well as canned routines. They're easy to set up, flexible and extensible, and connect other devices and services into an ecosystem.

These days, throwing a few benchmarks at a browser doesn't cut it. Just as you expect us to test graphics cards against the latest games, we think your browsers should be tested against a collection of live sites. Can they handle dozens of tabs at once? Or do they shudder, struggle and crash, using up your PC's processor and memory?

To pick a winner, we put Google Chrome, Microsoft's Edge and Internet Explorer, Mozilla Firefox, and Opera through their paces, barring Apple's abandoned Safari for Windows. We used the latest available version of each browser, except for Firefox, which upgraded to Firefox 40 late in our testing. And we also tried to look at each browser holistically. How easy was each to install and set up? Does Opera make it simple to switch from Chrome, for example?

Our tests have shown that enabling Adobe Flash can have much of an impact on your system. Disabling or refusing to load Flash can seriously improve performance – some sites, such as YouTube, have begun to transition to less CPU-intensive HTML5 streams. Still, other readers pointed out that they simply need to run Flash on their favourite sites. That's fine – we tested with and without Flash, so you'll have a sense for which browser performs best, in either case.



Microsoft's Edge browser, which has been integrated into Windows 10

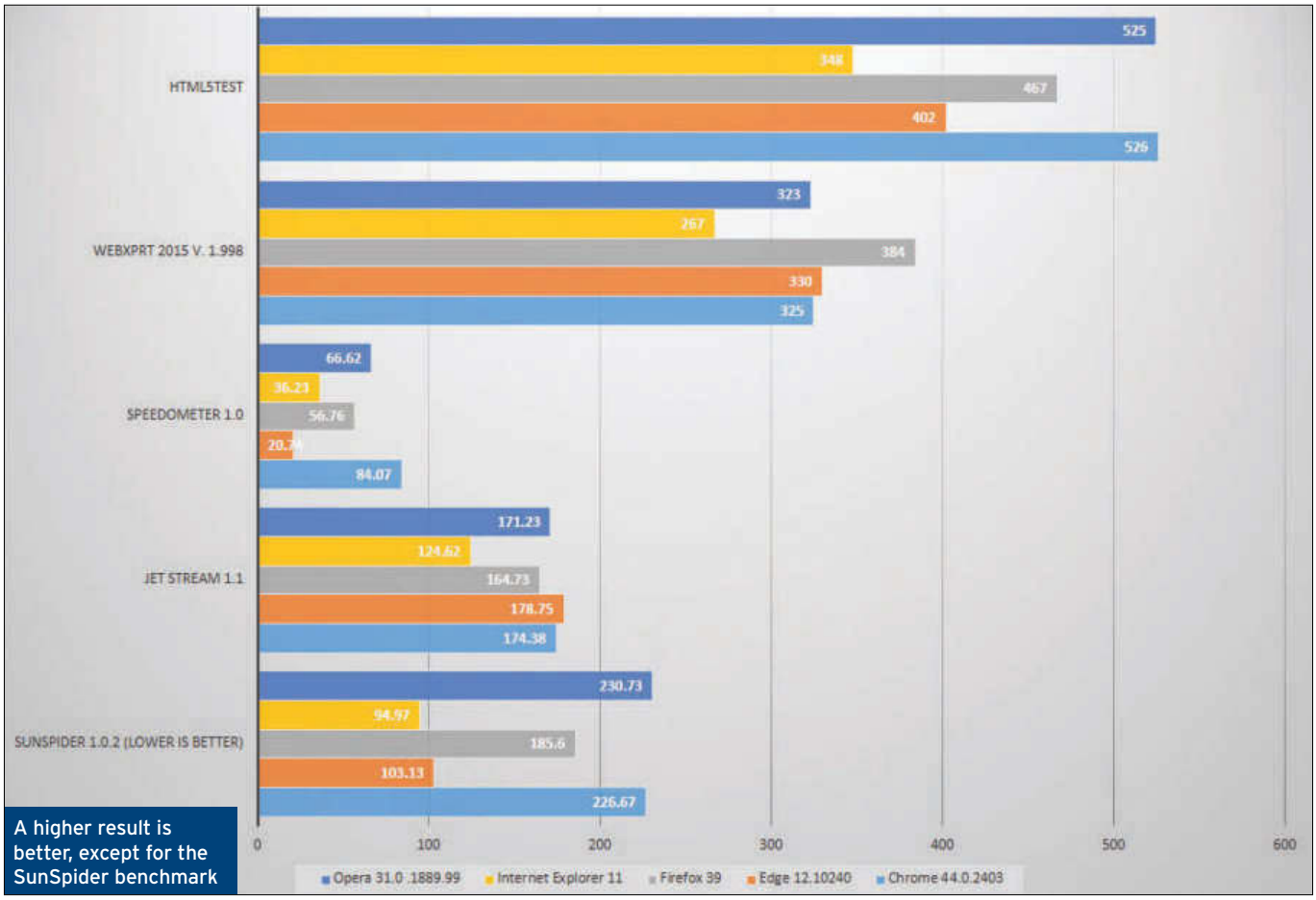
We also found that its Microsoft's Edge browser isn't as fast as the tech giant claims, though it still demonstrated definite improvement over Internet Explorer.

The benchmark numbers favour Chrome and Firefox

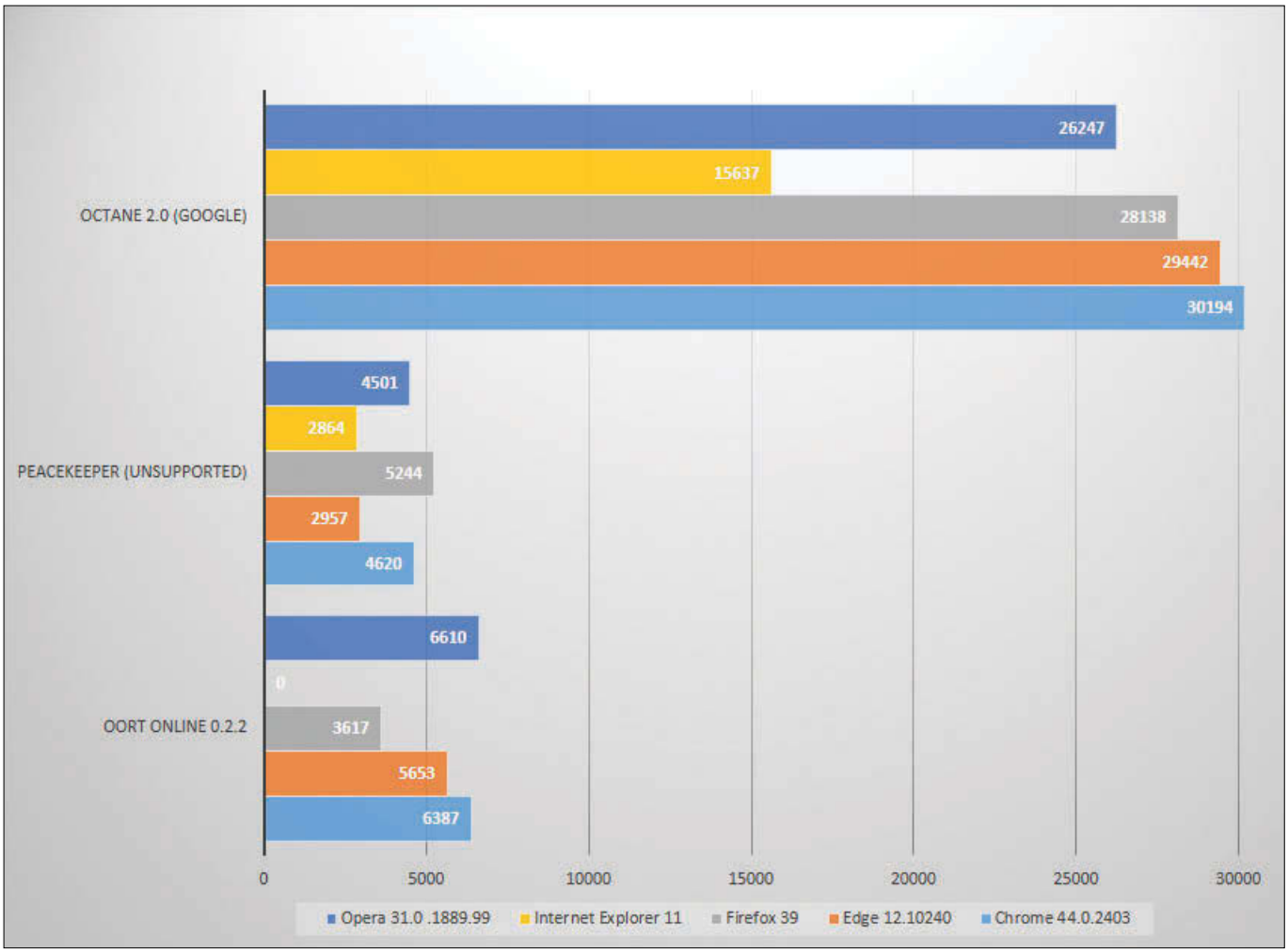
Although we consider benchmarks to be a valuable indicator of performance, we don't believe they are a wholly defining one. Still, they're the numbers that users want to see, so we'll oblige. We used a Lenovo Yoga 12 notebook with a 2.6GHz Intel Core i7-5600U inside, running a 64-bit copy of Windows 10 Pro on 8GB of memory as our test system.

We tested Chrome 44, Windows 10's Edge 12, Firefox 39, Internet Explorer 11, and Opera 31 against two popular (though unsupported) benchmarks – SunSpider 1.0.2 and Peacekeeper – just for reference purposes. But we'd encourage you to pay attention to more modern benchmarks, including Jet Stream, Octane 2.0, Speedometer (tinyurl.com/q2nrcm2) and WebXPRT. The latter two are especially useful, as they try to mirror actual





A higher result is better, except for the SunSpider benchmark



interaction with web apps. We also tested using Oort Online's graphics benchmark, as well as the standardised HTML5test, which is not so much a benchmark, but an evaluation of how compatible a browser is with the HTML5 standard for web development.

From our testing, Chrome and Firefox topped the Speedometer and WebXPRT tests, respectively. Perhaps unsurprisingly, Google was the fastest browser under the Google-authored Octane 2.0 benchmark. But Microsoft's Edge led the pack in the Jet Stream benchmark, which includes the SunSpider tests, which Edge led as well. (For all of the benchmarks, a higher number is better; the one exception is SunSpider, which records its score in the time it took to run.)

What's surprising about Edge is that it led the pack in the Jet Stream benchmark, but fell way behind on Speedometer, only to record a quite reasonable score in WebXPRT. (Microsoft claims that the web browser is faster than Chrome in the Google – authored Octane 2.0 benchmark as well, but our results don't indicate that.)

Chrome flopped on the SunSpider test; the only test Firefox failed equally miserably in was the Oort Online benchmark, which draws a Minecraft-like landscape using the browser.

For whatever reason, we noticed some graphical glitches as Edge rendered the Oort landscape, including problems drawing a shadow that slid across the bay in the night scene. But Oort proved even more problematic for Firefox, rendering 'snow' as flashing lights and rain as a series of lines. (We've included the test result, but take it with a grain of salt.)

What's surprising about Edge is that it led the pack in the Jet Stream benchmark, but fell way behind on Speedometer, only to record a quite reasonable score in WebXPRT

Internet Explorer 11 simply couldn't run the Oort benchmark at all.

We also included the HTML5test compatibility test, which measures how compatible each browser is with the latest HTML5 web standards. The only browser that fails that test, of course, is the semi-retired Internet Explorer 11.

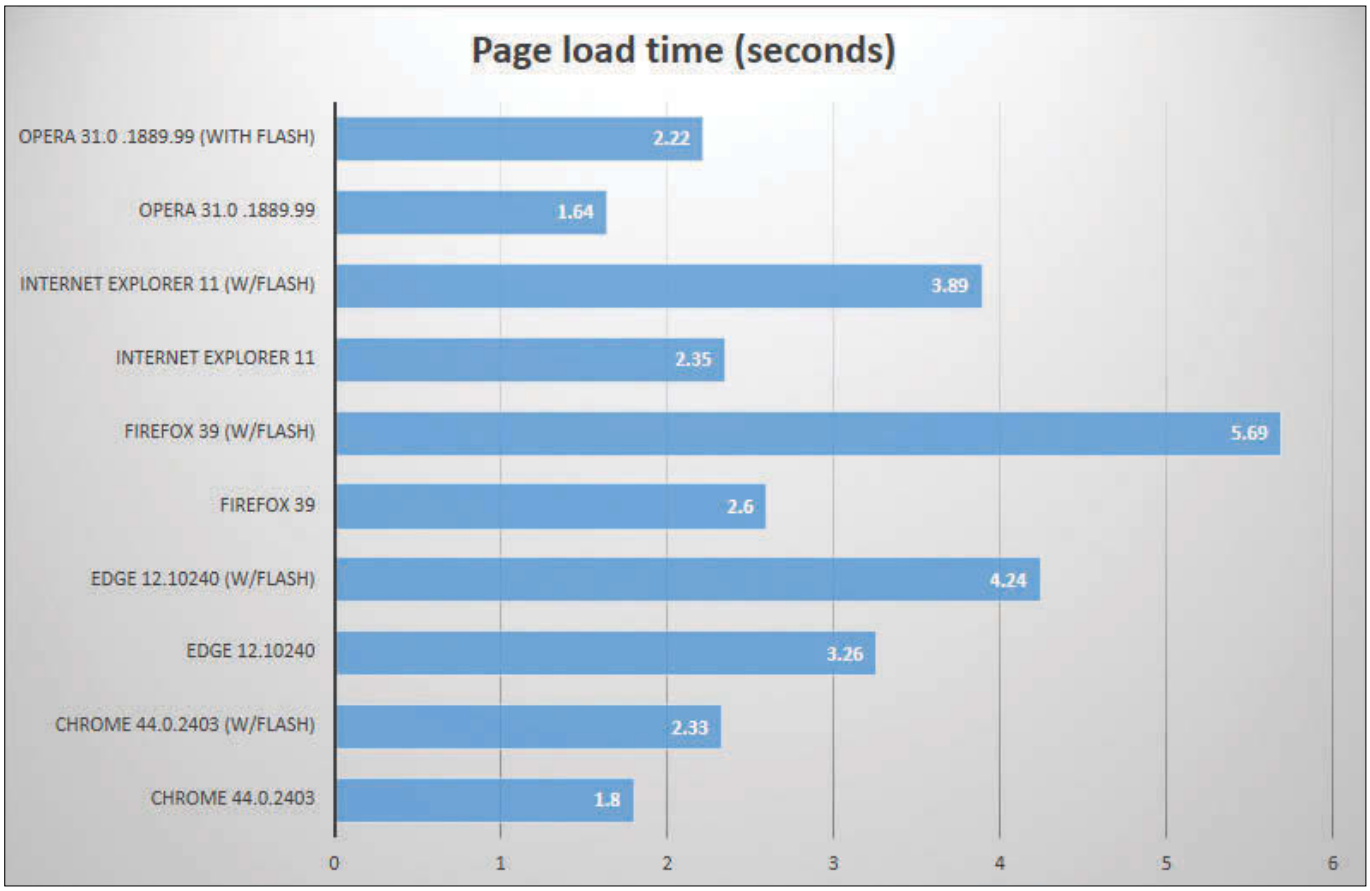
What does all this mean? It doesn't indicate a clear win for any specific web browser, including Chrome. Based on our benchmark tests, many of the browsers will handle the modern web just fine.

Real-world testing: Opera makes its case

Opera Software has always lived on the periphery, with what NetApplications (netmarketshare.com) says is just 1.34 percent of the worldwide browser market. With Opera considering putting itself up for sale, it may not be long for this world. But in terms of real-world browser performance, Opera is well worth a long hard look while you still can. Why? Because in real-world browser tests, Chrome and Opera performed very well.

It's important to know how each browser will actually perform while surfing the live web. Testing this is a challenge – some canny websites constantly tweak their content, and ads will vary from one visit to the next. But we tried to minimise the time over which we visited each site to help reduce variation.

We used a selection of 30 live sites, from Amazon to CNN to iMore, as well as



a three-tab subset of each, to see how performance scaled. Our tests included adding each site to a new tab, one after another, to weakly approximate how a user might keep adding new tabs – but quickly, so as to stress-test the browser itself. Finally, we evaluated them with Adobe Flash turned on and off. (Both Opera and Firefox don't natively ship with Flash, so we tested without, then downloaded the Flash plugin.)

After loading all 30 tabs, we waited 30 seconds, then added up the total CPU and memory consumption of both the app itself, the background processes, and the separate Flash process, if applicable.

So what does all this mean? If you own a mid-range and low-end PC, you might have purchased one without a lot of memory, or with a less powerful CPU. In that case, you might consider switching your browser to something that's more efficient.

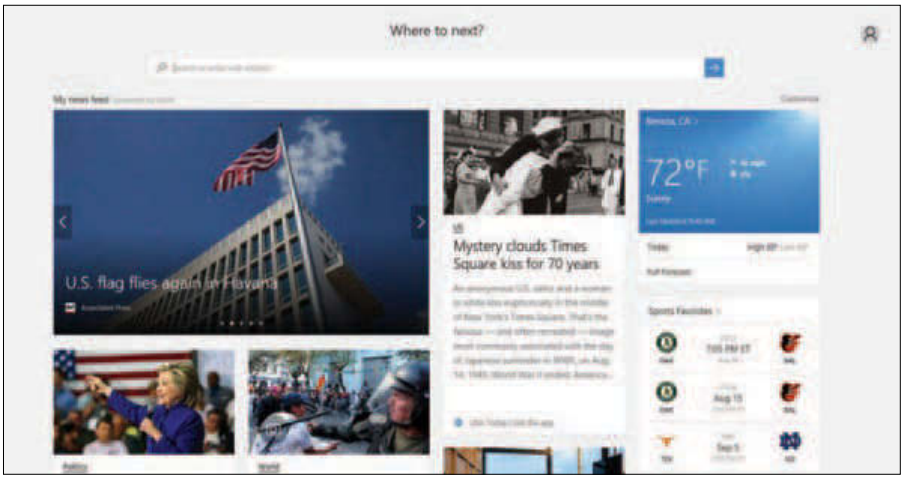
This chart contains a lot of information; you can click it to enlarge it. But what you should focus on are the differences in memory consumption (the yellow bars) and the differences in CPU consumption.

If you own a mid-range and low-end PC, you might have bought one without a lot of memory, or with a less powerful CPU. In that case, you might consider switching your browser

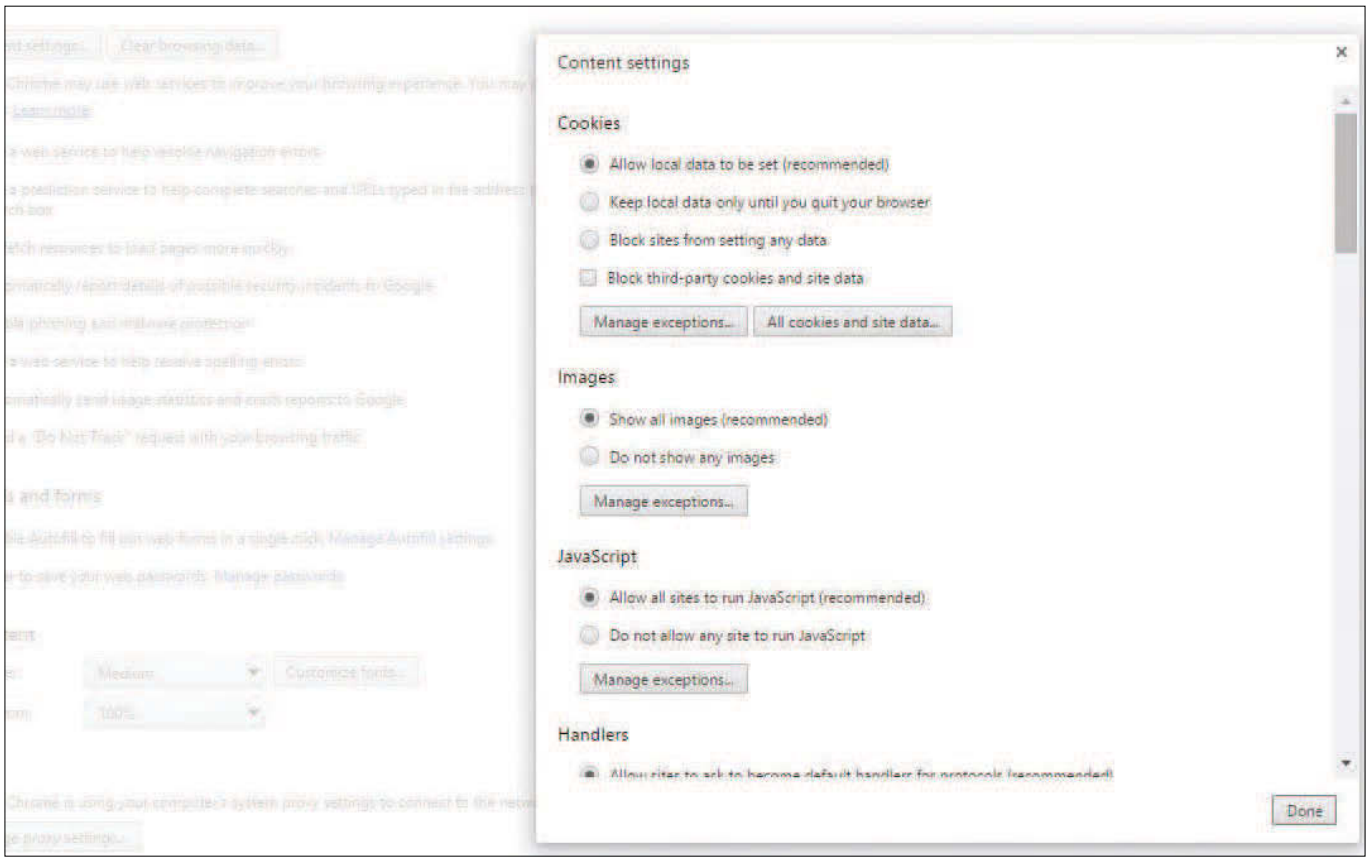
We've included the raw data in a table at the bottom of the chart. In each case, a lower number indicates a more efficient browser, with the one exception being Firefox (with Flash)'s zero scores, which we'll cover in the chart.

Oddly enough, we noted an actual decrease in CPU consumption when Flash was enabled on the three-tab test, specifically within Edge, Firefox, and Opera – perhaps because the Flash plugin was more efficient at lighter workloads. As our previous report indicated, however, CPU and memory consumption soared when we started throwing tab after tab at each web browser.

The other discrepancy that you may note is that Chrome, with Flash enabled, consumes nearly the memory that Edge does without Flash enabled. We double-checked this, but we did so on another day,



You can configure the Microsoft Edge home page to show you information that allows you to start your day



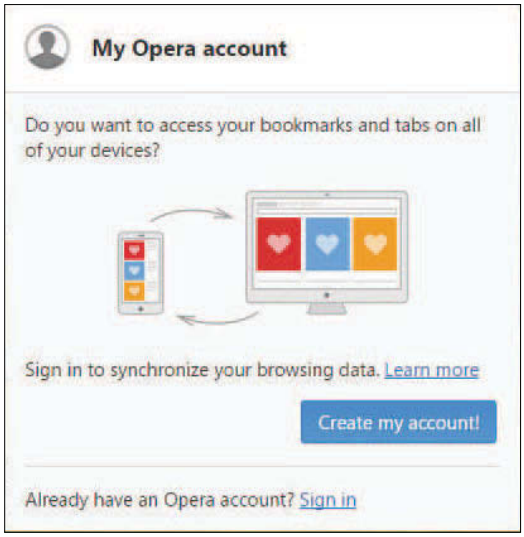
Chrome hides a wealth of options to manage what you see on the Web, but only if you want to explore

where Edge's memory consumption was even higher than what we recorded. (That's probably due to just a difference in the ads and video the sites displayed.)

Chrome has a reputation for sucking up all the memory you can throw at it, and these numbers prove that out. But it also consumes relatively little of your CPU, which, if you scale down your tab use, makes its impact on your PC manageable. Opera, however, really shines. In fact, without Flash, Opera consumed just 6.6 percent of the CPU and 1.83GB of RAM during our stress test. With Flash on, Opera consumed 3.47GB of memory and 81.2 percent of our test computer's CPU.

And Mozilla was getting on so well, but with Flash on, tabs in essence descended into suspended animation until they were clicked on, then began slowly loading. 'Tombstoning' tabs that aren't being used is acceptable, but we wish Mozilla would load them first.

Finally, we tried loading pages, then timing how fast before the page became 'navigable' – in other words, how soon one could scroll down. Fortunately, all the browsers we tested did well, although some were faster than others; Chrome and Opera did exceedingly well, especially with Flash turned off. In all, however, we'd say that any browser that can load pages at three seconds or less will suit your needs. (Keep in mind that the time to load pages depends in part on your Internet connection and the content of the page itself.)



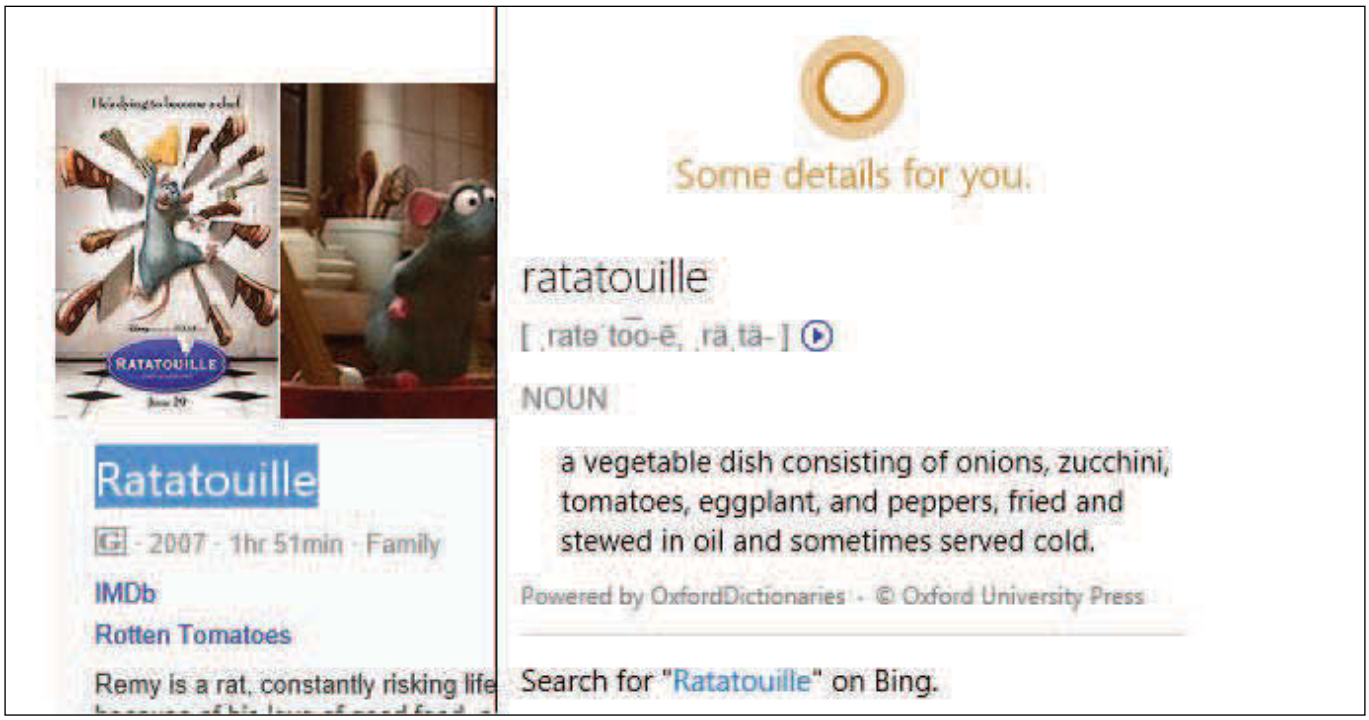
Many browsers, including Opera, now allow you to sync your information across multiple devices

The convenience factor

Since all of these browsers are free, you should be able to download every one and evaluate it for yourself. And each browser makes it easy to pluck bookmarks and settings from their rivals, especially from Chrome and Internet Explorer. But manually exporting bookmarks is another story. Firefox, for example, buries the export bookmarks command a few menus deep, while Opera claims that you can export bookmarks from its Settings menu, but only the import option appears to have remained in Opera 31.

More and more, however, browsers are using a single sign-on password to identify you, store your bookmarks online, and make shifting from PC to PC a snap – provided that you keep the same browser, of course.

Chrome, for example, makes setting itself up on a new PC literally as simple as downloading the browser, installing it, and entering your username and password. You may have to double-check that the bookmark bar is enabled, for example, but after that your bookmarks and stored passwords will load automatically.



Right-click a term, and Microsoft Edge's Cortana swoops in to assist

Chrome isn't alone in this, either. Firefox's Sync syncs your tabs, bookmarks, preferences and passwords, while Opera syncs your bookmarks, tabs, the 'Speed Dial' home page, and preferences and settings.

That's an area where Edge needs improvement. It can import favourites and bookmarks from other browsers, manually, but doesn't keep a persistent list of favourites across machines. But if you save a new favourite in IE11, it's instantly available across your other PCs. Other web browsers, though not Edge, also allow you to access your desktop bookmarks within their corresponding mobile apps.

It's also interesting that, more and more, browsers are moving away from the concept of a 'home page' in favour of something like Edge or Opera, where the browser opens to an index page, with news and information curated by the browser company itself. But you still have options to set your own home page in Chrome, Edge and Firefox.

All of the browsers we tested were relatively easy to set up and install, with features to import bookmarks and settings either from other browsers or other installations. You may have your own preferences, but it's a dead heat.

Going beyond the web

Modern browsers, however, go beyond merely surfing the web. Most come with a number of intangible benefits that you might not know about. Perhaps you'd like your browser to serve as a BitTorrent client, for example. In the early days, you needed to download a separate, specific program for that. Today, those capabilities can be added via plugins or addons, which most browsers offer, though not Edge. (This can be more than a convenience; Microsoft's browser will store your passwords, but not in an encrypted password manager like LastPass.)

If there's one reason to use Firefox, it's because of the plugin capability. Mozilla has a site entirely dedicated to plugins (addons.mozilla.org), and they're organised by type and popularity. Installing a plugin is as easy as clicking through a couple of notifications, then restarting your browser. And given the market share of Chrome – and the plugin popularity of Firefox – you'll find developers who will focus on those two first. A good example is OneTab (one-tab.com), which transforms all of your open tabs into a text-based list, dramatically cutting your browser's memory consumption. Note that the more plugins you add and enable, the more memory and CPU power your browser will consume.

Opera doesn't appear to have nearly the number of plugins (addons.opera.com) as Firefox, but it does have a unique twist: a 'sidebar' along the lefthand side that can be used for widgets, like a calculator or even your Twitter feed. Opera is also extensible via wallpaper-like themes, but they're far less impressive.

But you'll also notice browsers adding more and more functionality right in the app itself. Firefox includes a Firefox-to-Firefox videoconferencing service called Firefox Hello that works right in your browser, and you can save web pages to a Pocket service for later reading. And this is where Edge shines – its digital assistant, Cortana, is built right in, and there are Reading View options and a service to mark up web pages, called Web Notes. Cortana does an excellent job supplying context, and it's certainly one of the reasons to give Edge a try.

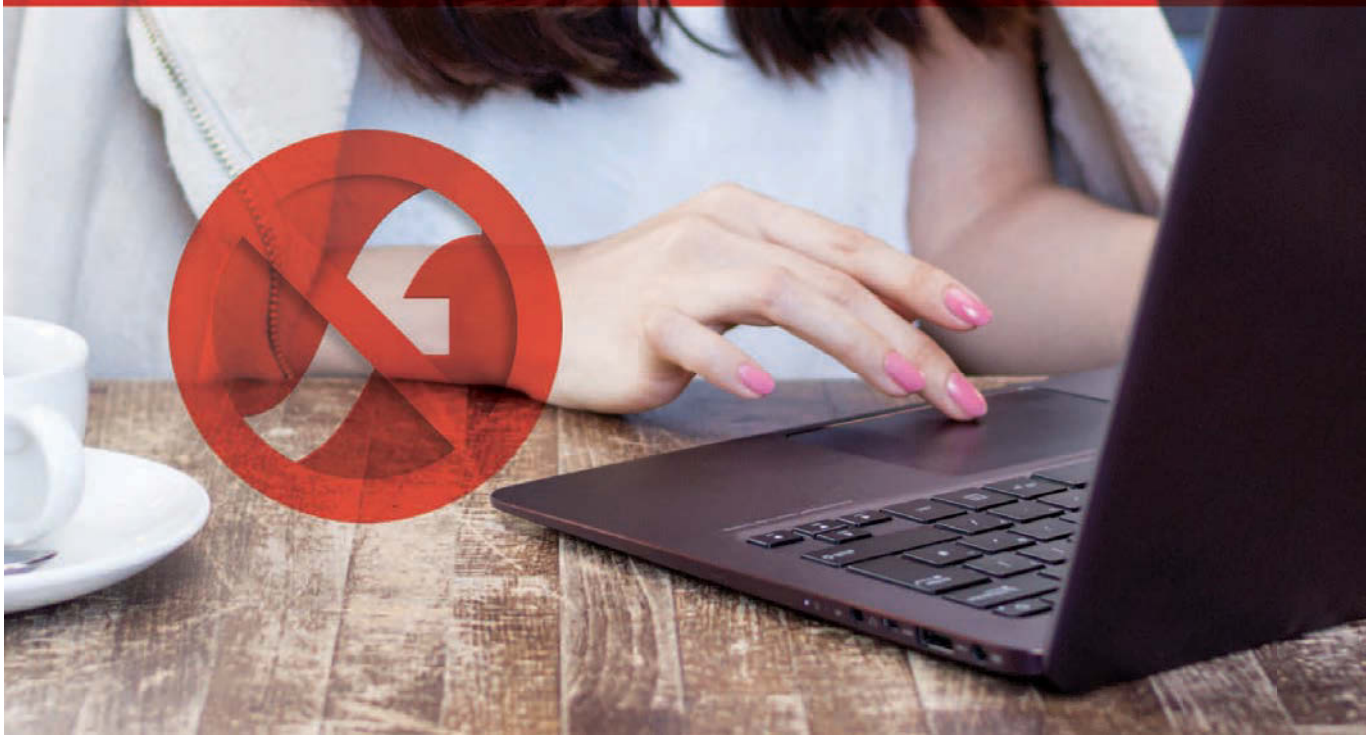
Over time, we expect that this will be one area where Edge and Chrome will attempt to pull away. In a way, it's similar to the race in office suites: a number of apps mimic functionality that Office had a few years ago. But Microsoft has begun building intelligence into Office and Edge, elevating them over their competition. Given that Chrome is also the front door to Google Now on the PC, we may eventually see Google try to out-Cortana Cortana on her home turf.

Chrome narrowly beats Opera

Edge's performance has improved to the point that it's competitive, though perhaps not as much as Microsoft would make it seem. Still, its lack of extensibility and proper syncing drag it down, at least until they're added later this year. Firefox also performed admirably, until it bogged down under our real-world stress test. We also believe Opera would be a terrific choice for you, since it zips through benchmarks and real-world tests alike. Yes, it lacks the tight OS and service integration of Chrome, IE and Edge, but some may see that as a bonus, too.

All that said, we still think Google's Chrome is the best of the bunch. It has a well-deserved reputation for using up any available memory, and our benchmarks prove it. But it's stable, extensible, performs well, integrates into other services. For that reason, Google Chrome remains our browser of choice, with Opera just behind. ☒

TESTED: HOW FLASH DESTROYS YOUR BROWSER'S PERFORMANCE



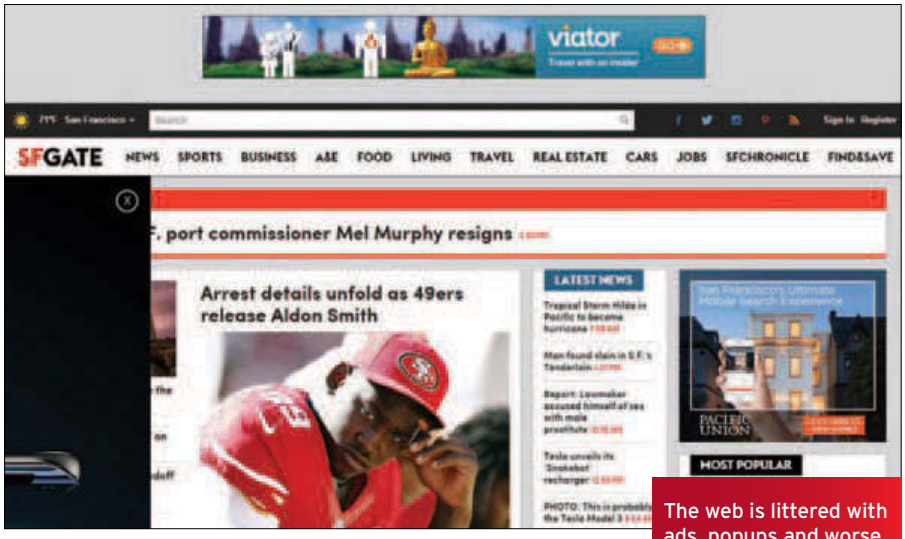
Mark Hachman tests the effects of browsing with and without Flash on several major browsers

This summer, the axe seemingly came down on Adobe Flash: three undiscovered vulnerabilities were leaked and exploited. In response, Mozilla's Firefox blocked Flash by default until Adobe issued a patch. You should know by now that installing the program equals a security risk, but are you aware of how badly your PC can slow down as well?

Try 80 percent

As part of our roundup of the major browsers, we tested their abilities to handle Flash. Two, Mozilla Firefox and Opera, do not include Flash, although you can download a plugin from Adobe to enable it. A third, Microsoft's new Edge browser, enables Flash by default, although you can manually turn it off. Both Internet Explorer 11 and Google's Chrome also include Flash, which you can disable or adjust within the Settings menu.

Adobe Flash is one of those legacy applications that just doesn't seem to go away. There's seemingly no real reason to install it – until you run into a blank spot on a page that asks you to install or update the Flash plugin. So you sigh, download (or enable) the plugin and go back to browsing.



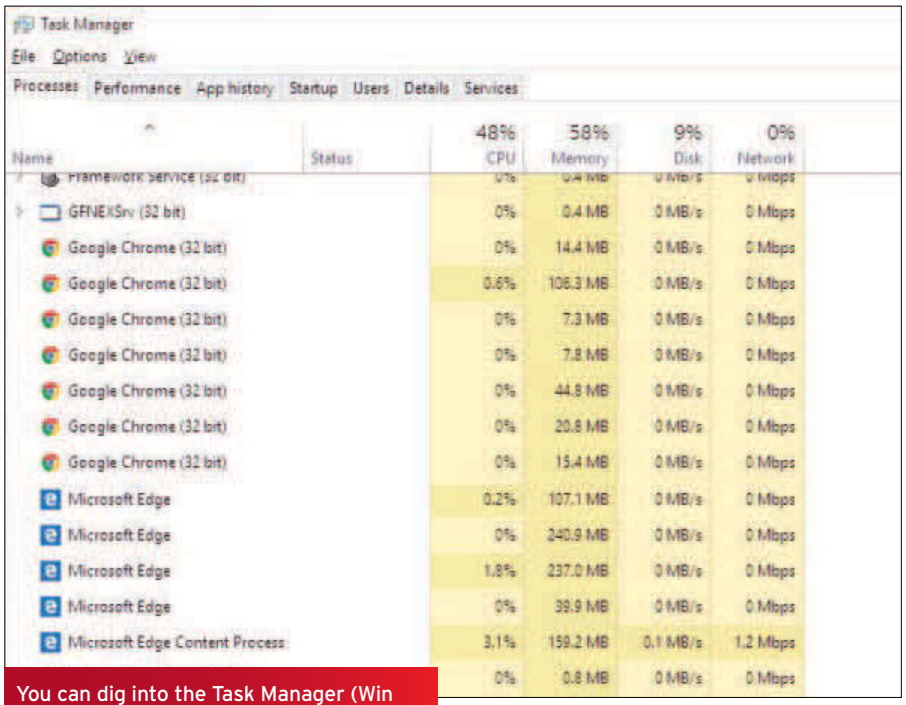
The web is littered with ads, popups and worse

Removing Flash and another PC security risk, Java, can be done, but it takes some effort, and most of us just aren't inclined to do so.

Testing in the real world

Let's start from the naive premise that Flash does not represent a security risk. Vulnerabilities occur in the background, surreptitiously lifting your data, installing rootkits, and the like. But they don't impact your day-to-day browsing, right? Maybe not, but simply using a browser with Flash installed can have major consequences on performance.

We used a test bed of 30 live sites, ranging from Amazon to CNN. Most of them have all sorts of embedded ads and trackers,



You can dig into the Task Manager (Win + X) to find out what's chewing up your system resources. All these background processes slow your PC down

which the sites use to track you, create a profile and sell you stuff. Since they are live, there's always a possibility that ads and content can change from one visit to the next, but we were able to do our live testing over the course of a single day to try and minimise this.

We tested Chrome 44, Windows 10's Edge 12, Firefox 39, Internet Explorer 11, and Opera 31 – all the latest versions at the time of writing. We ignored Apple's Safari browser. For Firefox and Opera, we ran our tests without Flash installed, then downloaded the plugin from Adobe's site. With Edge, we toggled Flash on and off, using its built-in control. Our test machine was a Lenovo Yoga 12 notebook with a 2.6GHz Intel Core i7-5600U inside, running a 64-bit copy of Windows 10 Pro on 8GB of memory.

Measuring the impact on your PC's CPU and RAM is somewhat subjective. Loading a page can take just a few seconds, for a text-heavy page with few embedded elements, while pages with embedded video, preroll advertising can take over a minute. We tried to split the difference.

From our list of links, we cut and pasted each link into a new tab, weakly approximating how a user would add one tab, then another. But we did it quickly, to try and stress the browser by throwing a number of elements at it, all at once. After loading all 30 sites, we then waited 30 seconds for things to settle down, before opening Windows 10's Task Manager and recording the CPU load and memory consumption of both the apps, as well as the background processes. If applicable, we added Flash's CPU and memory load as well. (We took a picture of the screen, then copied the results – a browser such as Chrome, for example, has lots of background processes, all dynamically changing by the second.)

It's important to note that, especially with a mid-range PC, that the amount of CPU cycles an app uses will probably be what causes your PC to stutter and pause – and that's going to be what frustrates you most.

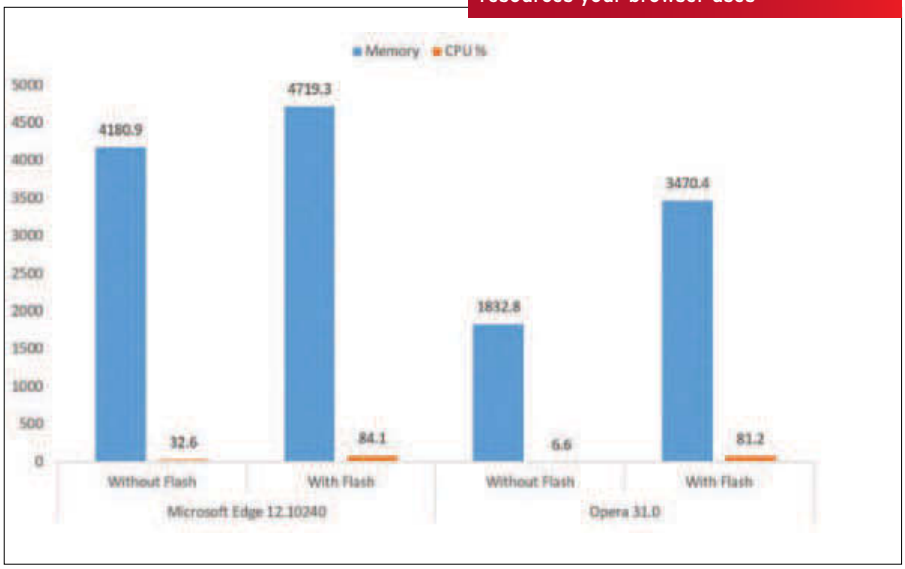
Shocking results

We condemned Microsoft Edge, for example, for locking up in previous iterations of our 30-tab stress test. With Flash enabled, Edge survived – a testament, perhaps, to a massive block of updated code that Microsoft recently released. With Flash enabled, Edge chewed through 4.72GB of memory, sucking down 84.1 percent of our test PC's CPU cycles. With just Word Mobile open, that left our system functional. But when we toggled Flash off, the same tabs required 4.12GB of memory, and just 24.5 percent of the PC's CPU. That's an 11 percent drop in memory consumed, and a whopping 61 percent decrease in CPU consumption.

And it just got better from there. Opera really surprised us with how efficiently it performed, consuming just 3.47GB of memory with Flash enabled – the lowest of all the browsers we tested. It chewed through 81.2 percent of our CPU. But as a clean install, without Flash, Opera consumed 1.8GB and just 6.6 percent of our CPU cycles.

Firefox did just as well, when you removed Flash from the equation. It consumed 1.65GB, and needed only 24.5 percent of the CPU. But after we downloaded Flash, Firefox seemed to throttle itself. The web browser never climbed above 29.1 percent of the CPU, but some tabs were unresponsive minutes after loading, and we had to manually check each tab to check on its progress. That was totally unacceptable.

Simply turning on and off Flash can make a significant difference in the amount of resources your browser uses



> But when we toggled Flash off, the same tabs required 4.12GB of memory, and just 24.5 percent of our test PC's CPU. That's an 11 per cent drop in memory consumed

Chrome also consumed 4.23GB of memory, and 71.4 percent of the CPU with Flash enabled. That was good, just by itself.

For Edge, some redemption

Of all the features that Microsoft highlighted with Edge, the one that jumps out is its ability to toggle Flash off and on. All the press releases we've seen from Microsoft have focused on its performance on a few benchmarks, rather than in the real world. And with Flash turned on by default, that performance has been lousy.

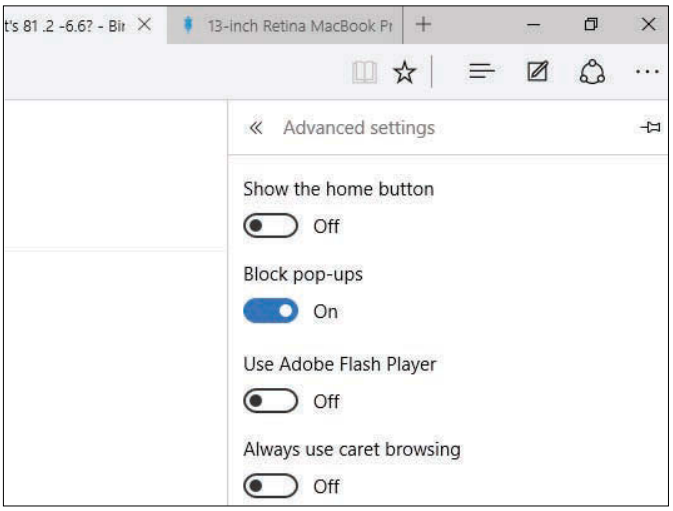
We can't say for certain which pages require Flash to be functional, if only because we've tolerated it for so long. But the toggle at least offers the possibility that Edge can be the modern, streamlined browser that Microsoft hopes it to be.

Edge, however, doesn't offer a middle ground. In Firefox, you can set Flash in a 'click to run' mode: Flash is installed, but it won't start unless you manually tell it to. (Chrome used to have a 'Click to Play' option for Flash, but it seems to have disappeared.) In Firefox, you'll need to find the Add-ons menu, then set the Flash plugin(s) to Ask to Activate. In Edge, Flash is either on or off.

Ideally, being able to turn Flash on and off on a per-tab basis might be even better, but the Edge team doesn't seem to have that on their feature road map.

Turn off Flash

If you have a browser with Flash installed, and think you might do better without it, here's a quick guide to removing it:



To toggle Adobe Flash off and on in the Microsoft Edge browser, go to the Advanced Settings menu

Microsoft Edge: This is easy. Click the '...' menu to the upper right, the Settings > Advanced Settings, then flip the Adobe Flash toggle to Off.

Google Chrome: From the 'hamburger' (three horizontal lines) menu in the upper right, click Settings, then scroll down to Show advanced settings. Under Privacy, click Content Settings. Scroll down to Plug-ins, then Manage Individual Plugins. You'll have the option to turn Flash on or off.

Internet Explorer: Click the cogwheel Settings icon to the upper right. Scroll down to Manage add-ons. When you're presented with a list, click on the Shockwave Flash Object and the Disable button, way down in the lower right.

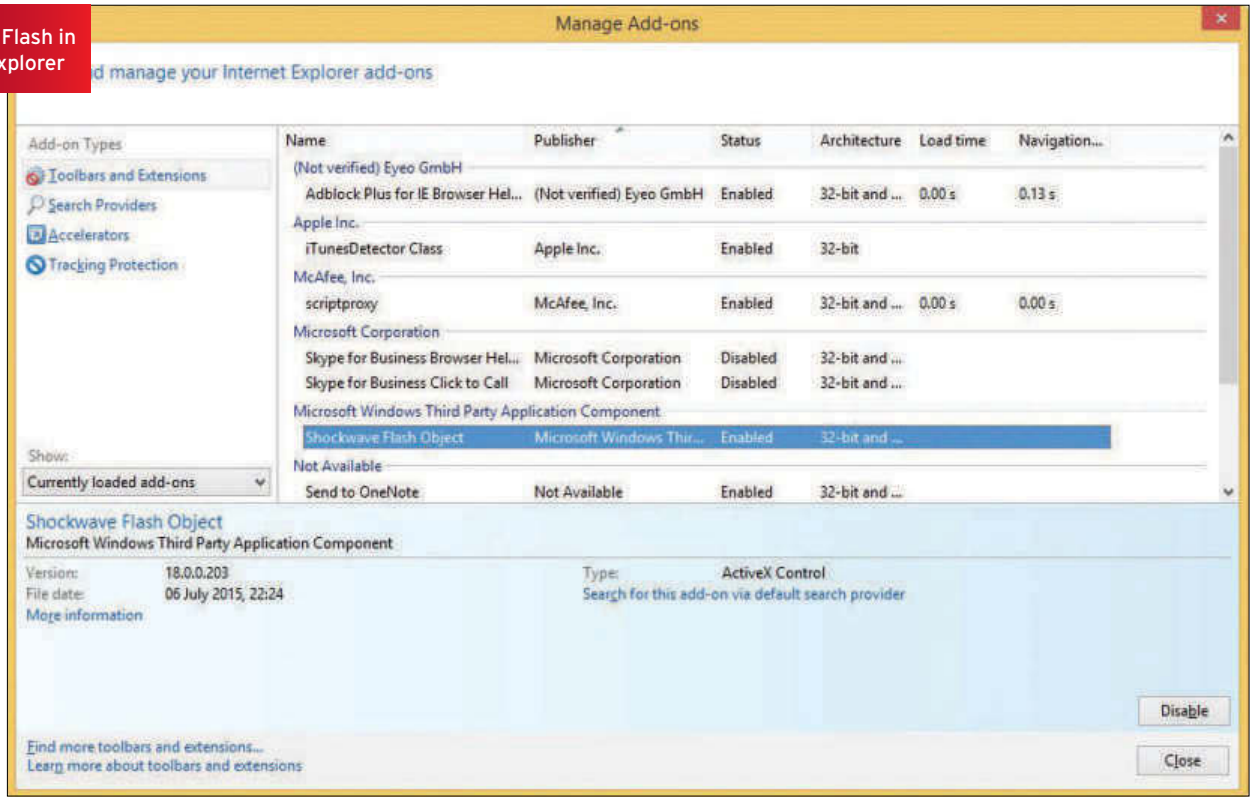
Mozilla Firefox: In Firefox, you'll need to go to the hamburger menu in the upper right, then click the Add-ons menu and set the Shockwave Flash plugin to Never Activate.

Opera: To uninstall Flash in Opera, go to the Windows 10 Control Panel > Programs > Programs and Features menu, then manually uninstall Adobe Flash Player PPAPI.

Flash obviously isn't the only culprit preventing you from browsing efficiently: JavaScript, other plugins, ads, and the like all bog down your browser and prevent it from seeing the content that matters. But as our tests prove, Flash certainly makes a tremendous difference.

Eliminating Flash can make a world of difference in your day-to-day browsing, and is just as important as any benchmark, which tells you how fast a browser loads pages

Switch off Flash in Internet Explorer



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AMD RADEON R9 NANO: A POWERFUL TASTE OF THE PC'S INCREDIBLE SHRINKING FUTURE



AMD's R9 Nano packs full-size performance into its 6in frame, but it's not for everyone. By Brad Chacos

AMD deserves some serious praise for creating the Radeon R9 Nano. This pint-sized powerhouse is the latest in a long line of AMD technical innovations that are ahead of the pack. Built around revolutionary tiny – and fast – high-bandwidth memory, the 6in Nano delivers flagship-level performance in a form factor that fits where most other graphics cards simply can't.

In an age where graphics cards keep expanding the number of heat pipes, heat sinks and fans in order to push performance, the Nano's more holistic design approach is a breath of fresh air, dragging mini-ITX (mITX) graphics cards out from the shadows and into the spotlight. It feels forward-thinking – the first top-tier graphics card designed for a future where mainstream computing increasingly shifts towards NUCs and Steam Machines, and small-form-factor designs and PCs-on-a-stick. There's no other card out there like it, and the Nano will bring tremendous joy to the people pining for its particular blend of high-end features.

But pushing the PC ecosystem forward isn't possible without some growing pains. The Radeon Nano rocks, but it won't appeal to everybody.

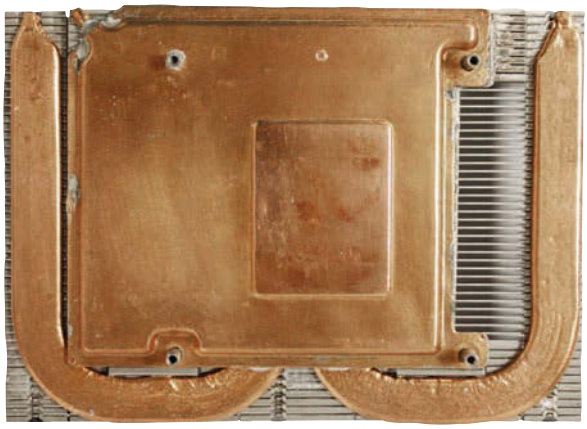
Under the hood

The £498 asking price for the Radeon R9 Nano has shocked some people, but AMD's deft design goes a long way toward justifying the flagship-level cost. This is the most powerful mini-ITX graphics card ever created, and every aspect of it screams premium.

The Nano's 6in length is its most notable feature, naturally, enabled by the tremendous space and power savings of high-bandwidth memory, which is integrated with the GPU. The card's a hair's breadth smaller in both length and width than Asus' GTX 970 DirectCU Mini, the Nano's closest



The Radeon R9 Nano inside a Lian Li mini-ITX case



The Radeon R9 Nano's cooler

GeForce-based miniature competitor. It's also tiny compared to the hulking Asus Strix Fury. The Fury is AMD's other air-cooled graphics card built around a Fiji GPU and cutting-edge high-bandwidth memory.

The Nano takes its design cues from AMD's other flagship, the similarly-priced, water-cooled Radeon R9 Fury X. The Nano has a black metal shroud with a soft-touch aluminium finish, and 'Radeon' emblazoned in bright red across its front and outer edge. It lacks a backplate though, and for cooling it sticks to a single fan integrated in the shroud, sitting on top of a card-length heat sink with horizontal fins. The GPU itself stays chilly thanks to a hybrid flattened-heatpipe/vapour-chamber solution. There's even a dedicated copper heatpipe that's just for the Nano's voltage regulator module.

Our deep dive into the Nano's design shines even more light on its inner workings, but the important part is that the cooling setup works well. That's a good thing, because AMD says customised Nanos from its graphics vendor partners, such as Asus and Sapphire, won't necessarily be available. If they ever are, it'll be at least three months after launch – and even then, third-party vendors won't be allowed to touch the GPU's base specs.

The Radeon R9 Nano has the same 4096 stream Fiji graphics processor as the Fury X, along with the same 4GB of HBM. The Nano's GPU isn't an exact mirror of its bigger brother, though: in order to squeeze Fiji into a mITX form factor without liquid cooling, AMD has reduced the clock speed of the Nano's GPU enough to allow the card to consume just 175W of energy over a single 8-pin power connector. The Fury X, on the other hand, requires two 8-pin connectors and 275W.

There's more to it than the listed specs, though. On paper, the Fury X is clocked at 1050MHz, while the Radeon R9 Nano hits up to 1000MHz, though the smaller card uses an aggressive version of AMD's PowerTune technology to dynamically adjust the clock speeds to meet the card's thermal and power targets. Observing real-time clock specs for the Nano using GPU-Z, it ran at 650- to 680MHz in the Furmark benchmark, typically 859- to 926MHz in 3DMark's Fire Strike (though it dropped to 700MHz during the last, most frantic scene), and 852- to 917MHz in Middle-earth: Shadow of Mordor.

That seems like a recipe for stuttering and framerate issues, but no: games were perfectly playable in our tests, while the card stayed cool and relatively quiet. AMD says the Nano will outpunch the older Radeon 290X flagship while using drastically less power, and we found this to be the case.

It also drastically outperforms the GeForce GTX 970, the most powerful mITX graphics card in nVidia's arsenal. The downclocked Fiji GPU in the Nano even trumps a full-sized GTX 980 in most cases.

This pint-sized powerhouse is one of the most capable graphics cards around, flirting with performance on a par with the Asus Strix Fury, a full-sized card with an imposing cooling setup. It demolishes the GTX 970, nVidia's most capable mITX graphics card. It's cool and quiet, and it manages to outpunch both the 290X and 390X, while using far less power.

There's no other graphics card like it. If you want uncompromising gaming performance from a mini-ITX PC and play at resolutions higher than 1080p, then the Radeon Nano is easily the most powerful option available. Its diminutive stature and cool performance will allow it to fit into small cases that full-sized graphics cards couldn't even dream of squeezing into.

"For anyone who wants to build a small form factor chassis capable of playing 4K, the Nano is really interesting and that's exactly where we targeted it," AMD's Victor Camardo told a Nano press briefing recently. "For those people who want power efficiency, who want high-performance, who want a good overall gaming



The Radeon R9 Nano on a mini-ITX motherboard

AMD Radeon R9 Nano
PRODUCT SPECIFICATIONS

Process	28mm
Stream processors	4096
Computer units	64
Engine clock	Up to 1000MHz
Computer performance	8.19 TeraFLOPs
Texture units	256
Texture fill-rate	256 GT/s
ROPs	64
Pixel fill-rate	66GP/s
Z/Stencil	256
Memory configuration	4GB HBM
Memory interface	4096-bit
Memory speed/data rate	500MHz/1GB/s
Memory bandwidth	Up to 512GB/s
Power connectors	1x 8-pin
Typical board power	175W
PCIe standard	PCIe 3.0
API support	DirectX 12, Vulkan
FreeSync support	Yes
Virtual super resolution	Yes
Framerate target control	Yes



solution that's optimised to take advantage of all aspects of the product, and not just push one curve or the other to the max."

The AMD Radeon R9 Nano does just that. It feels unique. It feels forward-thinking, a harbinger in a world increasingly focused on cramming full PC performance into ever-smaller cases. And more than that, it feels like a premium product that oozes style. People may scoff at the Nano's cost, but it manages to trade performance blows with the Strix Fury and EVGA GTX 980 FTW despite its far more diminutive stature and enviable power efficiency.

It's an amazing graphics card that fully justifies its price point. Most people, however, shouldn't buy it.

Stumbling points

The Nano isn't just a niche product, it's an ultra-niche product – more a showcase for the space- and power-savings of HBM and Fiji than anything else. Currently, there are only a handful of (admittedly gorgeous) PC cases small enough to fit the Nano, but too compact for a larger graphics card. If size isn't an issue, it makes more sense to spend your money on the far greater performance of a Fury X or GTX 980 Ti.

What's more, some technical issues hold back key would-be use cases for the Nano. At this size, AMD's card would be perfect for a killer home theatre PC designed around a 4K TV, but its lone HDMI port is 1.4a, not 2.0, which means it's limited to 30Hz at that resolution. To be fair, nVidia's HDMI 2.0-equipped high-end GeForce cards lack HDCP 2.2 support, so they can't play protected 4K content either. It's still disappointing in a card like the Nano, though. To find a graphics card with HDMI 2.0, HDCP 2.2, and H.265 encode/decode, you have to look to the GTX 960 or GTX 950, which don't offer anywhere near the gaming performance of the Radeon Nano.

The Nano would be perfect for a killer home theatre PC designed around a 4K TV, but its lone HDMI port is 1.4a, not 2.0, which means it's limited to 30Hz at that resolution

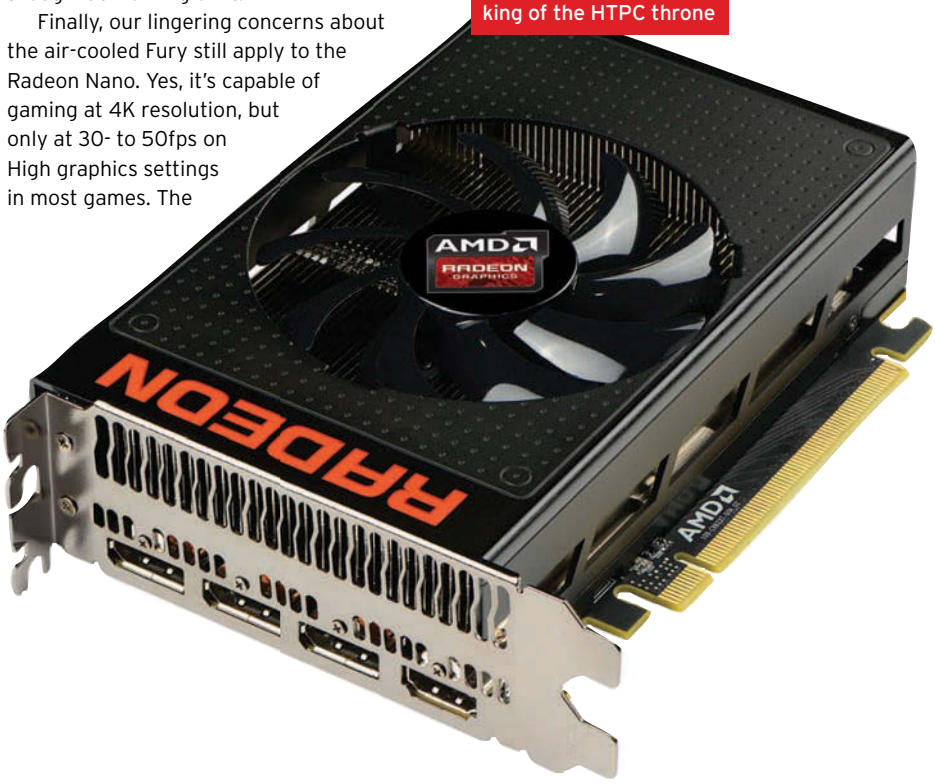
Likewise, the small size but powerful performance of the Radeon Nano would make it seem well-equipped for Valve's impending Steam Machine line-up, but SteamOS is based on Linux, and AMD's Linux drivers don't perform well at all, though it's working on it.

Finally, our lingering concerns about the air-cooled Fury still apply to the Radeon Nano. Yes, it's capable of gaming at 4K resolution, but only at 30- to 50fps on High graphics settings in most games. The golden standard for PC gaming is 60fps, so you'll either need to pick up a FreeSync monitor to smooth out your gaming or dial the resolution back to 2560x1440, where the Nano rules the mITX roost, but the GTX 970 mITX still performs well And at 4K, the Nano's 4GB of HBM is fine now, but we'd be worried about the long-term prospects of so little memory in future games at such high resolutions.

Add it all up and you're looking at a niche market for the Nano, and gorgeous, powerful flagship products for niche markets always command a price premium. The Nano is worth the money for someone who needs its blend of features. Mini-ITX gaming PCs don't need to compromise performance for size anymore.

Finally, let's loop back to where we began: AMD deserves credit for creating this card in the first place. This is innovation. HBM's radical power efficiency and space savings is the future of graphics card memory, and small form factors are increasingly becoming the new norm in desktop PCs, sold on the energy efficiency in Intel's recent chips.

The AMD Radeon R9 Nano gives us a glimpse of that future today, fully earning its flagship status and hopefully encouraging case manufacturers, and the rest of the component ecosystem, into further investments in smaller gaming PCs. The Radeon R9 Nano may not make sense for most gamers today, but we're glad it exists, and can't wait to see the next version. ☒



The HDMI 1.4a port on the Radeon R9 Nano hurts its claim to be king of the HTPC throne

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HOW TO BUY GADGETS FROM THE US



Buying tech from the US can be a great way to get around delayed release schedules or even to save some money. Here we show you the things to look out for when shopping overseas for smartphones and other cool gadgets. By Martyn Casserly

It's true that we here in the UK have access to plenty of cool smartphones, tablets, and gadgets. Sometimes, though, US companies make the odd decision to release new products but withhold them from our shores. Frankly, that just isn't cricket. Thankfully, it isn't too hard, in this global digital world in which we live, to have the items shipped directly to you. The question is how do you do it? Or more importantly, should you? In this feature we'll examine the pros and cons of shopping across the Atlantic, and the hidden costs that can be involved.

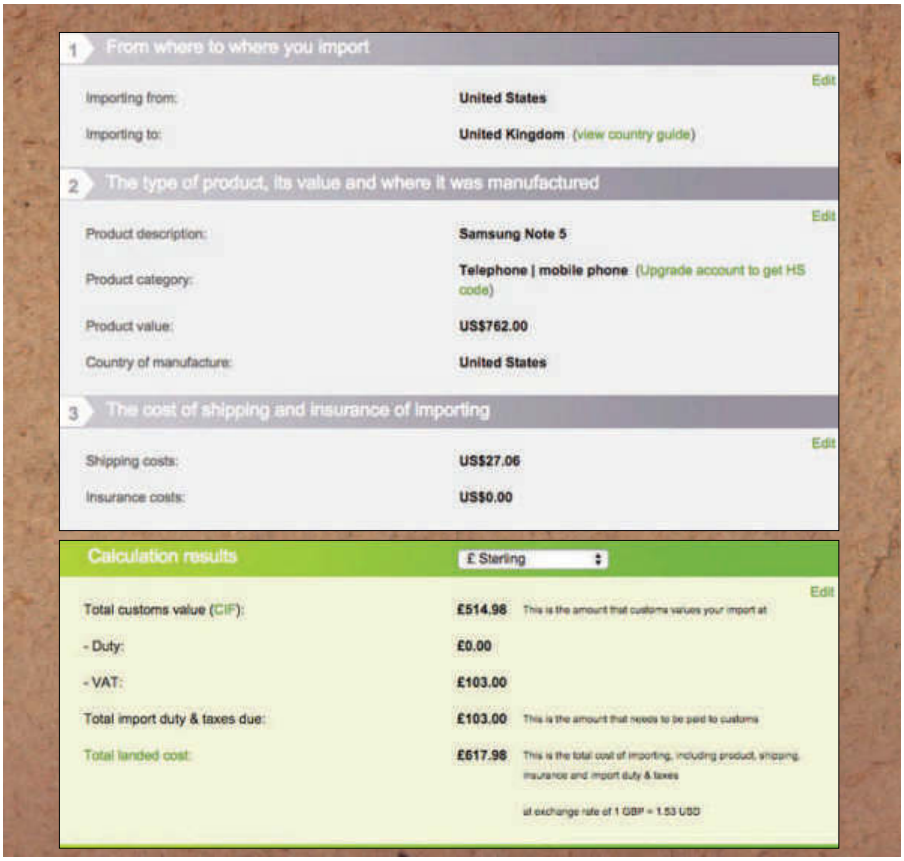
Why buy from the US?

With many of the biggest tech-related companies based in America, it's not uncommon for certain devices to only be released in that territory, or at least appear there months before they do in the UK. If, say, you want the new Samsung Note5, Amazon Echo, or the high-end 1TB version of the new Microsoft Surface Pro 4, then you won't see them in UK stores any time soon. Then, of course, there is the exchange rate, which can make prices seem a lot more tempting thanks to the strong value of Sterling against the Dollar. There are, however, a few things to bear in mind.

Tax

Those prices might seem tempting at first glance, but you'll need to factor in the local sales tax, which will be added at the checkout. These vary from state to state, so research is needed before you click on the Buy button. And that isn't the only tax you need to consider. Any tech item with a value of over £15 that comes into the UK from non-EU countries is liable for VAT, which will be applied when the device reaches Customs.

That adds a rather significant 20 percent to the total cost, which for an expensive item will be a hefty chunk. For example, we



sourced a Samsung Galaxy Note5 in the US, which looked tempting at £515, but when we entered the details into the Duty Calculator website (tinyurl.com/nhtx95m), it showed a final figure to be £618. There can also be additional delivery costs from Customs, as well as Duty charges dependent on the type of product you buy.

You may have heard people tell you that all you have to do is get the sender to mark the goods as a gift, and you'll get away with it. However, any reputable company will refuse to do that as it's a form of fraud, and secondly this only applies to items worth less than £36. VAT will once again be charged when your item reaches Customs, and you'll also still be expected to pay a Duty of 2.5 percent on a gift item if its value is between £135 and £630, with other rates applied if it's worth more than that.

Warranties

Warranties can also be problematic. Often the responsibility falls on the retailer rather than the manufacturer if there are any problems. This is fine if you can walk back into the store in which you bought the item, but if you live in a different country, then obviously this is very difficult. Again ,close attention should be paid to the terms and conditions of the warranty before you buy.

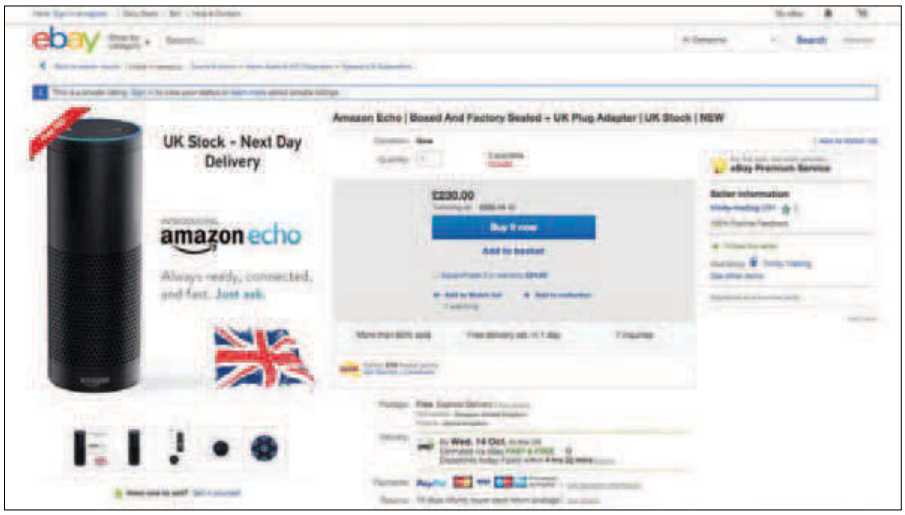
Compatibility

If you're thinking of buying a smartphone from the US, then you'll need to first ensure that it will be compatible with the mobile operators in the UK. While you might think that a Samsung Note5 or Sony Xperia Z5 will work anywhere in the world, you can't always take this for granted.

Manufacturers tend to make a range models for various regions, with the differences mainly boiling down to which 4G LTE and GSM frequency bands they use. In the UK it will need to work with GSM 900, 1800 (1.8MHz), or 2100 (2.1GHz), and LTE bands 3 (1.8MHz), 7 (2.6GHz), and 20 (800MHz). To ensure that your intended device is compatible look for the Technical Specifications section of the product listing.

How to buy products from the US eBay

Perhaps the easiest way to shop in the US is to use eBay. As the site is a global marketplace, you'll often find sellers willing to ship overseas. Again, the caveat of



Customs charges needs to be considered, plus insurance would be a good idea. Whether you get a good deal or not depends on how much you want the product.

For example, on Amazon's US site the Echo is currently listed for sale at $179.99, which roughly translates to £118. Local sales taxes will be applied in the US, but on the UK ebay site the common cost for the Echo is a more substantial £230. It's worth noting that you can find listings for the same products on the UK and US eBay sites (ebay.co.uk and ebay.com), with some physically located in the states and others already on UK shores. Listings found on eBay UK will already have VAT factored into the price, of course.

Ask a friend

If you have friends travelling to the US, then you can always ask them if they mind picking up the item for you. They would, however, have to declare the item at Customs, where the same rules apply as listed above.

Use a reshipping service

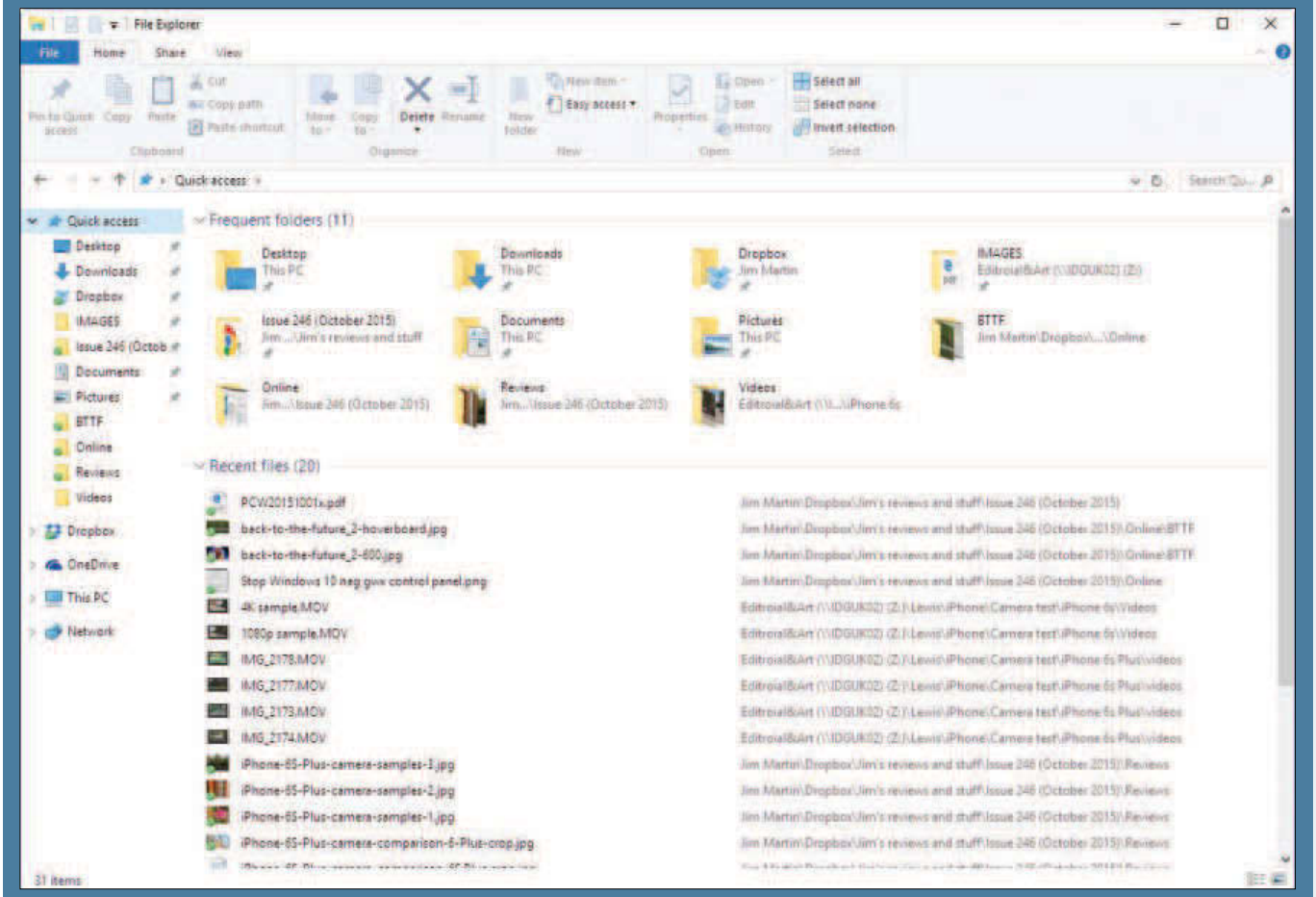
One clever way to get around the problem of US sites not posting to UK addresses is to use something called a reshipping service. For a small fee, these companies give you a real US address and then forward the packages on to you. Reship is a good example, with clear instructions and charges listed on its site. Of course, the dreaded Customs rules still apply.

Using a Personal Shopper service

If you don't want to go through the rigmarole of setting up US accounts and delivery addresses, then a more civilised approach is to use a Personal Shopper service. With these, you simply contact the company, tell it which item you want, and it will go and source the best deal, buy it for you, then send the device to your UK address. Extra costs are involved, but when we tested out Big Apple Buddy (tinyurl.com/mbmpuL3), the final bill for a £500 smartphone was only increased by a £26 service charge, which seemed very reasonable for taking the hassle out of the process.

If you don't want to go through the rigmarole of setting up US accounts and delivery addresses, then a more civilised approach is to use a Personal Shopper service





Customise File Explorer's details in Windows

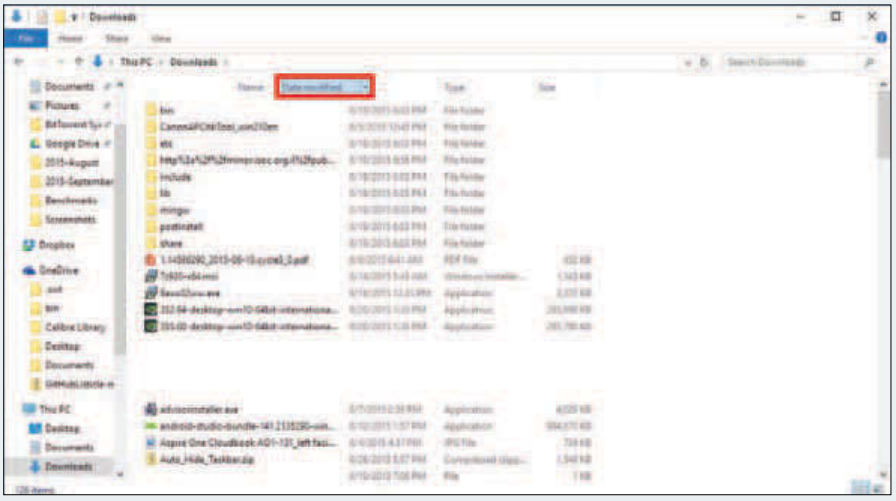
Getting File Explorer organised the way you like it is quick, easy and worth it. Ian Paul shows how

We've talked about File Explorer before, and it's one of the most important parts of Windows to customise. You'll spend a lot of time diving into your PC's file system and it's worth it to get things organised just how you like it. One good way to do that is to customise a folder's column order – name, size, type, date modified, and so on – under the details view. It's easy to organise columns in the order you'd like instead of just using the defaults. In fact, you can even apply a particular column order that you create to most other folders on your system. Here we'll be showing how it's done in Windows 10, but the steps also apply to Windows 7 and 8.

Sorting downloads

Let's say that you wanted to have the date show up first in the downloads folder. Just click on Date at the top of the column, and then drag it to the left. If you wanted to put the date column last, you'd do the reverse. If you then wanted to sort everything by date, single-click on the Date column. Now all the files in the downloads folder will be sorted by date with the oldest items at the top. To reverse that order, click Date again.

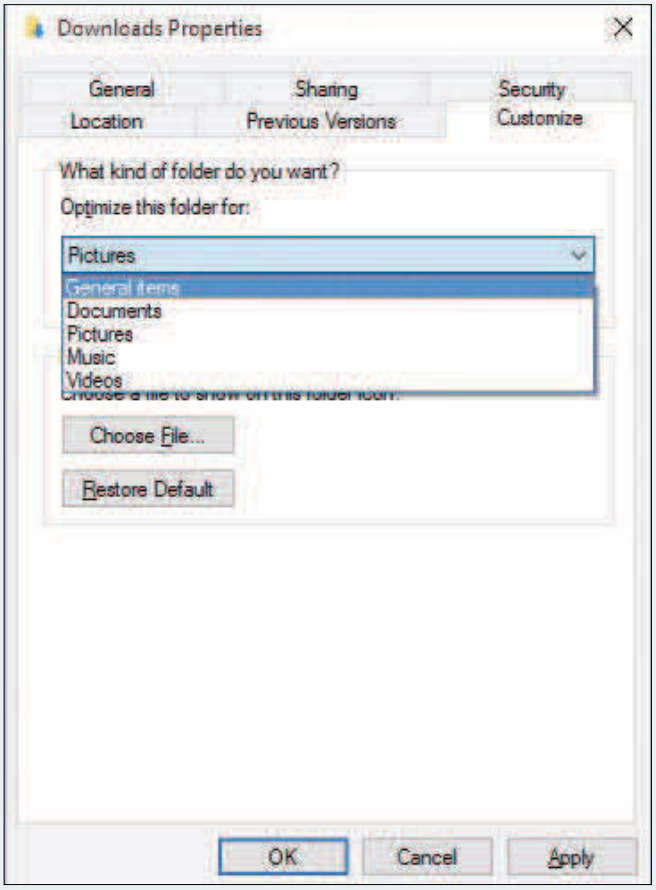
This trick works for all columns.



Making a template

Now, let's say you wanted to use a particular column setup from your downloads folder across all generic folders on your computer. Click on 'This PC' in the lefthand navigation column of File Explorer, then right-click on Downloads in the main window and select Properties from the context menu. Click the Customize tab and look under the first section, which reads: Optimize this folder for.

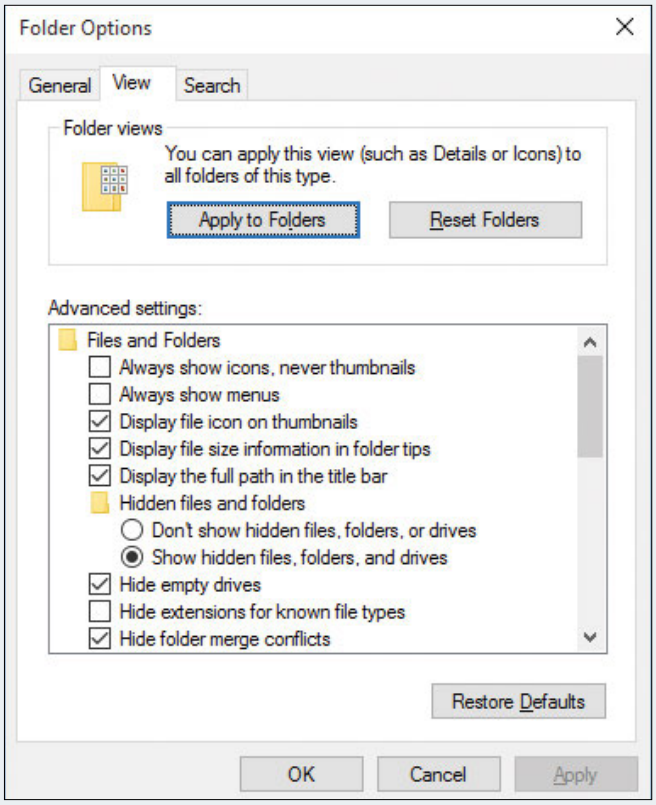
You'll see a drop-down menu with five options that are the standard layout templates for File Explorer. By default in Windows 10, the downloads folder uses the pictures template. Here we'll change that to General Items so that our downloads setup can affect most of our folders, while leaving the standard Windows documents, music and video folders untouched. Click the checkbox next to Also Apply This Template To All Subfolders.

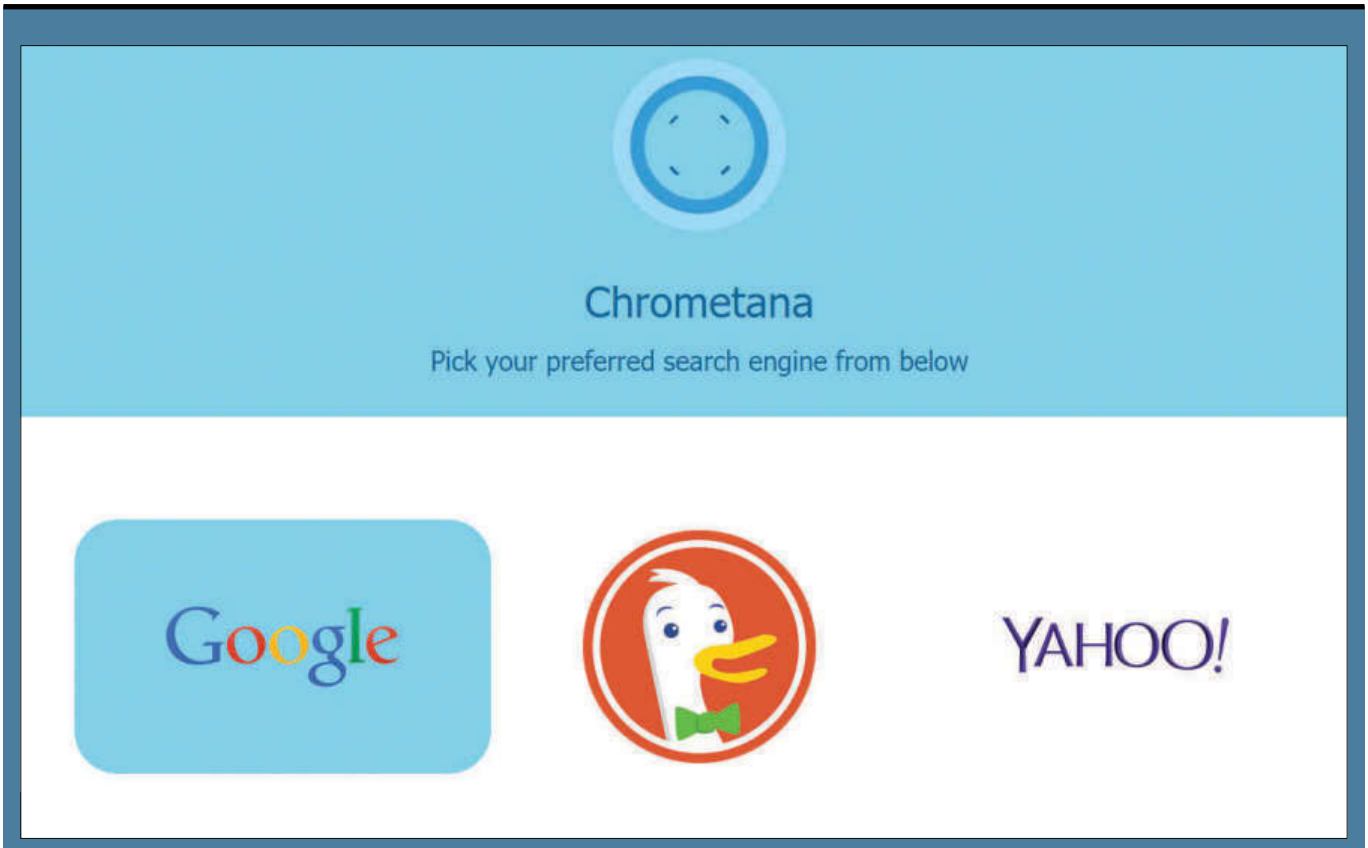


If you've already customised your downloads folder, then changing to General Items will, unfortunately, return all column headings to the standard General Items template. Sort them again the way you like. For example, someone might prefer to see the filenames first, followed by file size, then type, and the date.

Once it's sorted, go to the File Explorer menu at the top and select View › Options › Change Folder And Search Options. Under the View tab, click Apply To Folders. A pop-up window will appear asking you to confirm the change to all folders of the same type (General Items in this case). Click Yes, and all your generic folders should now default to your predefined structure. You can even switch other folders to your template by simply changing the template for that folder under Properties › Customize.

To revert to the standard layout for all folders, go back to View › Options › Change Folder And Search Options, and under the View tab click Reset Folders. ☒





Get Cortana to search Google instead of Bing

Windows 10's Cortana uses Bing, but there are ways to get Google instead. Ian Paul reports

Windows 10's Cortana provides a great way to quickly launch a web search, though you may not appreciate that Microsoft's digital assistant defaults to Bing – and there's no built-in way to get Cortana to switch to Google instead.

The lack of multi-search engine integration makes a certain amount of sense since Cortana's cloud-based brains are powered by Bing. That works out fine for tracking flights, getting directions or getting a weather forecast for the next few days. But when it comes to displaying search results, many people prefer Google to Microsoft's search engine. Fortunately, there are a few solutions that can redirect your Cortana web searches from Bing to Google.

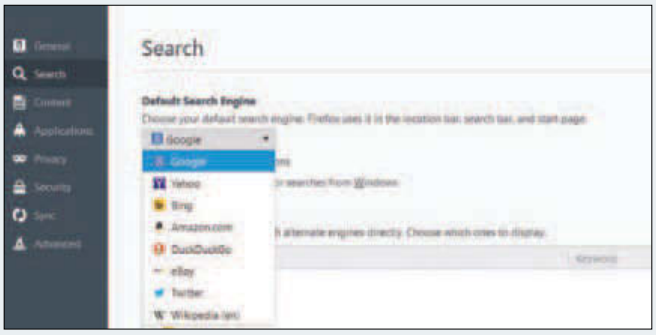
The downside is that these solutions work only with Chrome or Firefox. That means if Microsoft Edge, Opera or Internet Explorer is your browser of choice you'll have to make due with Bing or switch your default browser. If you're not big on Google, these solutions also work with DuckDuckGo and Yahoo.

Firefox

Firefox is the simplest of the two to get working as it has the ability to switch your Cortana search engine automatically and without any third-party add-ons. All you have to do is set the most recent version of Firefox as your default web browser.

Once you've done this, try searching with Cortana. You'll notice that Firefox displays your search results using the browser's default search engine. If you haven't used Firefox before that means your Cortana searches will show results from Yahoo. Switching to Google, however, is easy.

Open Firefox and click on the magnifying glass icon in the search bar. Next, a drop-down menu appears where you can



select Change Search Settings. In the tab that opens, click the drop-down menu under Default Search Engine and select Google. Now whenever you launch a search using Cortana, you'll get results in Google instead of Bing.

Chrome

Chrome won't natively redirect your Cortana searches in Firefox-like fashion, but there is a third-party extension that offers the same effect: Chrometana (see opening image).

After you've installed Chrometana from the Chrome Web Store, type **chrome://extensions** into the address bar. Scroll down until you see Chrometana and click Options.

A new page will open, allowing you to choose Google, DuckDuckGo or Yahoo as your preferred search engine for Cortana. Click the search engine of your choice, close the tab, and then do a search via Cortana. Just as before, the results will open up in Google instead of Bing. ☒



Set different wallpapers for multiple displays

Ian Paul explains how to assign different wallpapers for multiple monitors in Windows 10

One of the nicest additions to Windows 8 was its robust support for multiple monitors, including the ability to easily set separate, individual wallpapers for each screen in your setup. All you had to do was open the Control Panel, go to the personalization section, right-click on the images you wanted, tell them which display to use them on, and you were done. Unfortunately, Microsoft decided to do away with that ease of use in Windows 10.

The official way to add different backgrounds in Windows 10 is to select two images in File Explorer (meaning they both have to be in the same folder), then right-click and select Set as desktop background. The two images will now appear on your two monitors, with the image you right-clicked occupying your primary display.

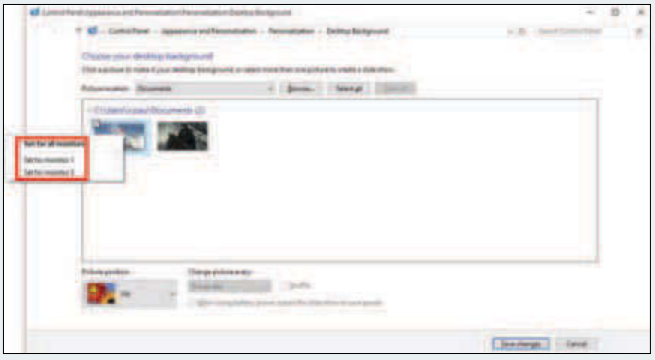
The problem is that is method automatically swaps the images between the two monitors every 30 minutes by default – a nice feature that some may like, but we'd rather set our backgrounds individually and leave them. It's also tricky to assign images to the display you'd like in a setup with three or more displays.

Windows 10 doesn't offer an obvious way to set static, individual wallpapers for every display in your multi-monitor setup, but thanks to some help from Reddit's Windows 10 forum, we can get back to the Windows 8 way of doing things. This trick requires a little tinkering with the Run command, but it's nothing major.

First, tap the Windows logo key + R to open the Run window, then type the following:

control /name Microsoft.Personalization /page pageWallpaper

Once that is in place, click OK or tap your keyboard's Enter key. That should take you straight to Control Panel › Appearance and Personalization › Personalization › Desktop background. This section was a normal part of Windows 8, but is hidden in Windows 10 – you can't manually find it in the Control Panel or the Settings app's Personalization options.



In this window (shown above), you can select from the images shown or browse for other images on your PC. If you see any images with check boxes, deselect them.

Once you're ready to set your background images, right-click the image you want on your first monitor and select Set for monitor 1. Then do the same for the second display, only choosing Set for monitor 2, and so on if you have additional monitors.

Once everything is configured to your liking, click Save changes and you're done.

Unfortunately, you'll have to use the Run command to return to this hidden part of the Control Panel each time you want to change your background images. ☒



Fix Windows' update process if it gets stuck

If your PC freezes during Windows update process, Martyn Casserly's tips will get you back on track

As with any new operating system release, you can expect to be downloading a lot of updates and patches in the initial stages of running Windows 10. Microsoft has made automatic updates mandatory for the Home edition, so it's not easy to decide when you apply the patches. There is a way to get around this particular feature though, which you'll find in our How to Stop Windows 10 updates guide on page 108. But if you find your PC sitting at a certain percentage value indefinitely, then Windows Update is probably stuck in a loop. Here's a quick way to interrupt this cycle and get the update process back on track.

Fix Windows Update

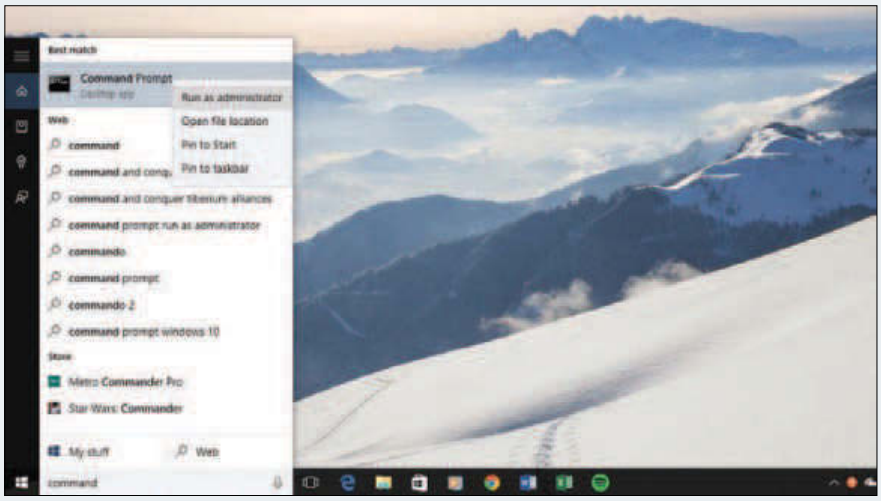


It's important though, to give the update a decent amount of time to finish. Depending on what is being done to the system this could take a few hours. It's not the normal amount of time, granted, but it does happen. So before you tinker, and if it's possible to be without your PC for a while, then it's certainly worth letting it plod along for a while to see whether this clears the problem.

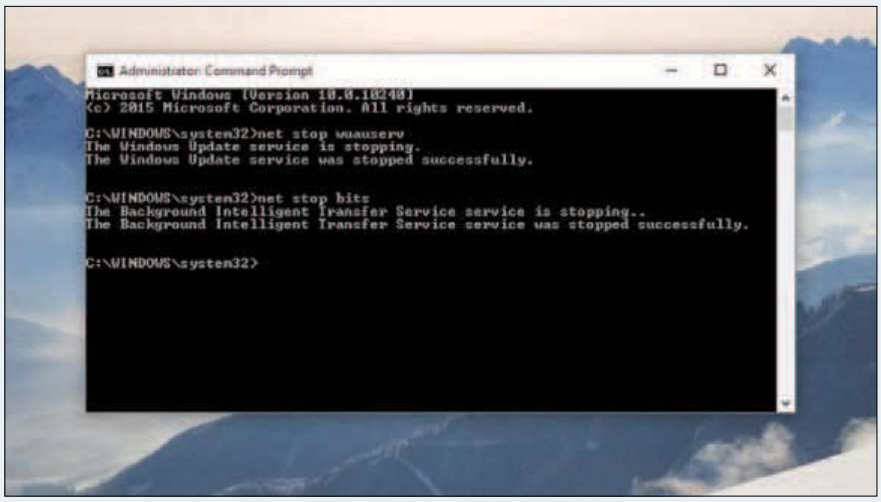
Another issue could be that of your internet connection. If the updates are at the downloading rather than installation stage, then a slow or problematic connection could mean that the update is struggling to make its way through to your PC. Again, time is the answer, or possibly resetting your router. One way to check the speed of the connection is to try using the web on another device and see if it can navigate happily or if it too gets bogged down. A more scientific approach is to navigate to speedtest.net and use the free service that measures the rate of your current connection.

Command prompt

If the process is definitely stuck, then there is a quick way to reset the update. Go to the Start Menu and type **command prompt**. You'll see the utility listed at the top of the results. Right-click on it and you'll be given the option to Run as Administrator.

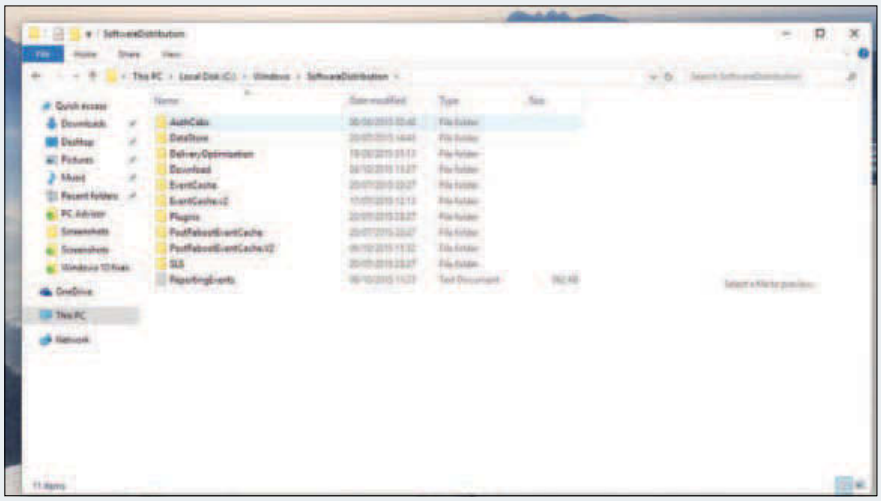


Select this and you'll see a black window open up. Now you can enter the command that will stop the update. To do so, type **net stop wuauserv** and press Enter. Then type **net stop bits** and press Enter again.



Now that the update has been stopped you can close the Command Prompt window. Open up File Explorer and navigate to **C:\windows\softwaredistribution** and you should find a number of files within the folder. Select all of the contents and then delete them, but leave the folder intact. You may see a message saying that some of the files are in use and can't be deleted, in which case you'll just need to reboot your system and then try again.

Once the update has been stopped and the softwaredistribution folder has been emptied all that's left to do is reboot your PC and then run Windows Update again. To do this just type **Settings** into the Start Menu, choose the top result, then select Update & Security › Check for Updates. Hopefully, this time the process will finish without issue. ☒





Stop automatic updates in Windows 10

Martyn Casserly shows how to stop unwanted updates being downloaded and installed in Windows 10

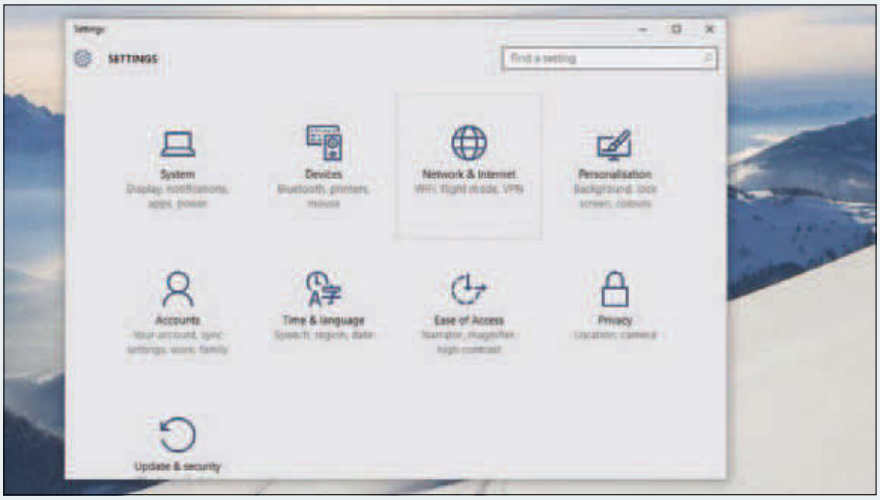
Microsoft has made automatic updates in Windows 10 Home compulsory, and to a lesser extent in Windows 10 Professional. There are good reasons for this, the foremost of which is security, but if you don't want your system to be constantly downloading patches and possibly breaking apps or causing other problems, then there are a few options available. We'll guide you through the workarounds that exist and how you can implement them. It should be noted though, that due to the security fixes that come with the updates, we would advise leaving the automated service on if you want your system to remain safe.

First you could upgrade to the Pro version of the system, which brings additional features and increased control. If you're happy with your current system, then there are a few ways to get around the update issue.

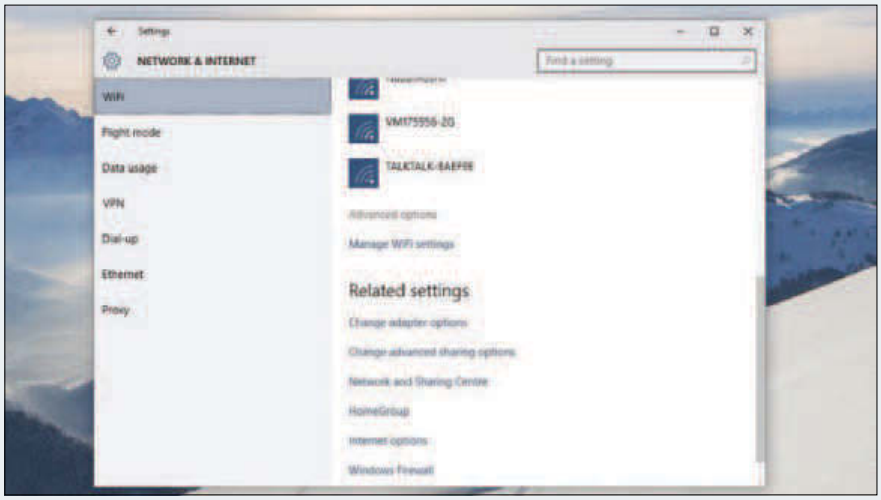
Pretend to use a metered Wi-Fi connection

One way to stop Windows installing updates is to fool the system into thinking that it's actually working on a restricted data plan. This only works over Wi-Fi though, so if you connect your PC to a router via a network cable then the fix won't apply.

To set this up, go to the Start Menu and search for Settings. Select the top result and choose Networks & Internet.



You should automatically default to the Wi-Fi section, so scroll down in the righthand panel and select Advanced Options.



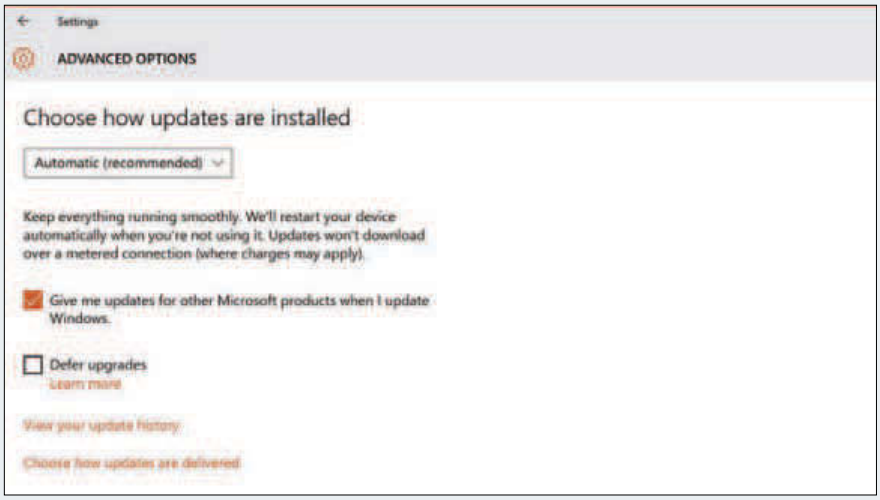
In this setting, you'll see the option for Metered Connection, and below it the switch to turn it on. Enable this and Windows will regard the current network you're connected to as a Metered Connection. This means it won't download updates as it could use up your data allowance. This isn't a global setting though, so if you regularly take your PC to other networks (one at work, for example), then you'll need to repeat this process when you first go there, otherwise it will be considered a normal Wi-Fi connection and Windows will run the updates. These settings are all remembered by the system, so once you've set them up, the rules will then automatically apply every time you connect to that network. If you ever want to revert back to your normal state, then just turn off the Metered Connection option.



Defer upgrades

While Home users are stuck with having to work around automatic updates, Professional users have a built-in option that allows them to defer updates for several months. The best part of this option is that security patches are still applied, it's just system updates that are held back.

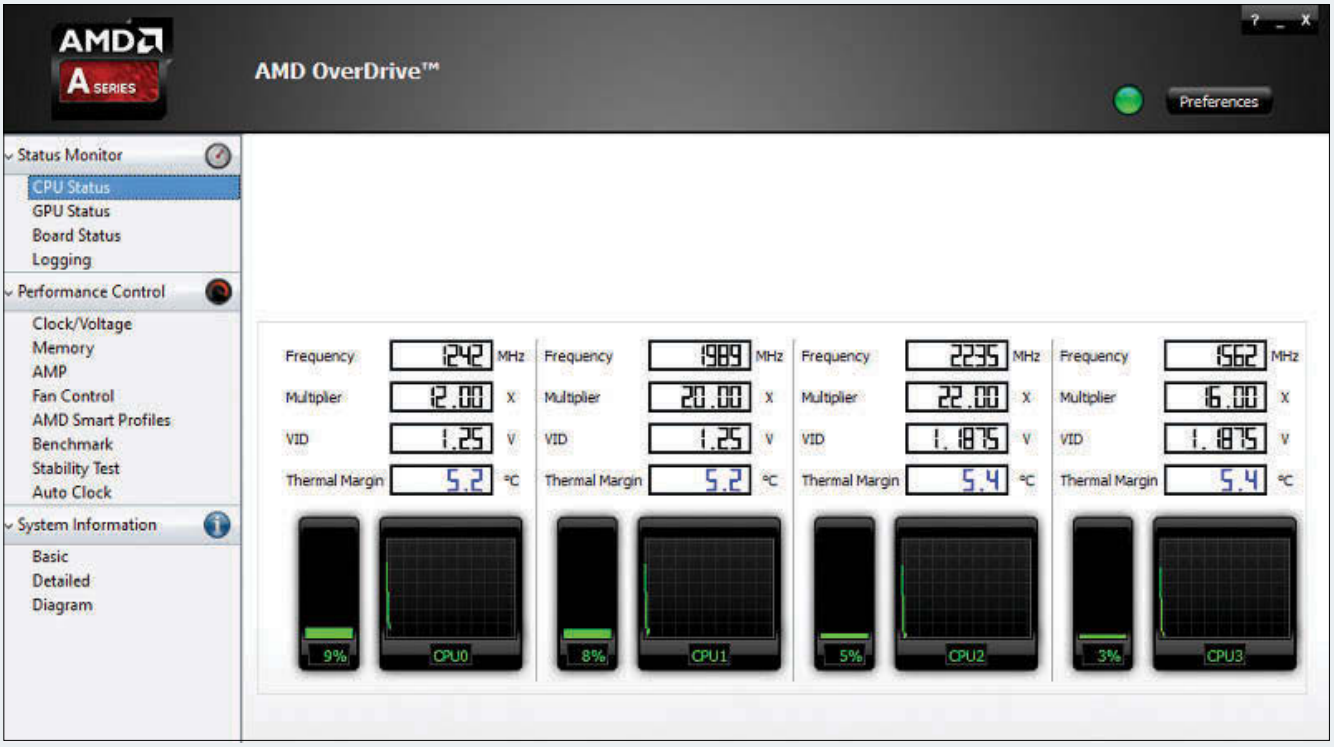
To enable the feature, go to the Start Menu and type Settings, then select the top option. From Settings go to Advanced Options and there you'll find the Defer Upgrades tick box under the Choose How Updates are Installed section. Click on this and you won't have to worry about updates for a while. ☒





Overclock your PC's Intel or AMD processor

Chris Martin explains why overclocking can be a great way to boost your PC's performance



Overclocking is the process of making your CPU run faster. It's a bit like tuning a car's engine and remapping the ECU to extract more performance. The performance is already there, but by default the manufacturer restricts performance to a 'safe' level to ensure it's reliable for longer. You can choose to make your CPU work faster by changing a few settings, though there are risks.

The speed of your CPU is calculated by taking a base clock rate, such as 99.8MHz, and multiplying it by the multiplier, which could be 34. In this example, it equates to a clock speed of 3400MHz, which is 3.4GHz. You can increase the clock speed by changing the base clock, but it's more common to adjust the multiplier. You can do this only if you have an 'unlocked' CPU.

Warnings and risks

You should note that some risks are involved. For starters, overclocking will almost certainly void your system's warranty, although some are built with overclocking in mind. You may also damage the CPU or other components by overclocking.

Before you start

Since overclocking involves pushing your CPU beyond its factory settings, you should monitor it. We recommend you download and install software such as CPU Z (tinyurl.com/2frynb5) in order to do so – it can measure and display a real-time measurement of each core's internal frequency and memory frequency.

It's also a good idea to check all your fans are working properly, especially the one cooling your CPU heatsink. Pushing the CPU harder creates more heat, and if you don't dissipate this you risk damage. Making sure that your computer is clean inside will help to keep it as cool as possible.

Which processors can I overclock?

As a general rule of thumb, the higher-end processors are approved for overclocking. Not every CPU can be overclocked, so you'll need to have one that is unlocked in order to manipulate the base clock rate or multiplier.

Intel's Core i7 Extreme Edition is unlocked and so are the latest sixth-generation Core i7 and Core i5 chips. If you're not sure, then Intel has detailed specs at ark.intel.com, or you can simply attempt to overclock and you'll soon find out.

AMD's latest FX range of processors come unlocked, as well as some Athon models. Once again, if you're not sure, then you can simply try and overclock and see what happens rather than spending forever researching your particular chip.

Software or BIOS

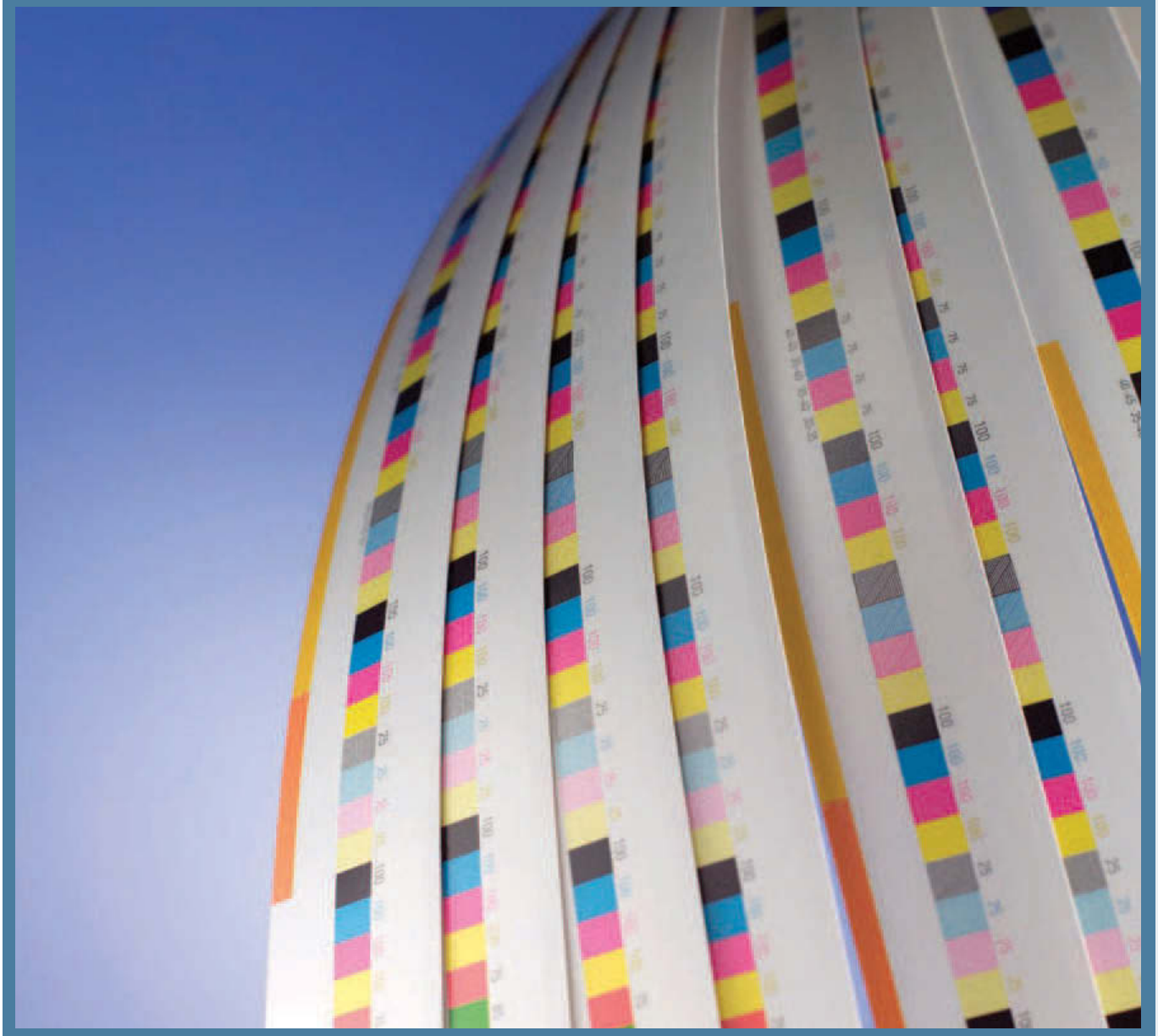
If you're trying to overclock an Intel processor, you can download the Extreme Tuning Utility (Intel XTU) software (available at tinyurl.com/pp44twz) in order to do this. It provides access to the settings you need to overclock such as power, voltage, core and memory.

On the AMD side of the fence, you'll need to download OverDrive (tinyurl.com/pvwv3kr), which is in effect doing the same thing. It includes automatic tuning if you're unsure of what you're doing, control over your fans, monitoring and also stability tests.

If you'd rather not use software, then you can go down the old-school route of using the BIOS. Boot into the BIOS using the correct F-key and find the section where you can change the settings of your CPU (every BIOS is different but it shouldn't be hard to find). Now change the multiplier up by one, save your settings and boot the PC.



If your system runs smoothly and stably at the new speed, then you can try to push it further. If your PC boots incorrectly or you experience any performance issues, then you probably need to decrease the multiplier back down to a stable level. ☒



Ensure your printer never runs out of ink

Martyn Casserly reveals how HP and Epson will make sure that your printer is topped up with ink

It's fair to say that, aside from the 3D variety, printer technology has hit something of a plateau in terms of print quality, speed and features. Most printers you can buy these days will offer colour inks, wireless connection, and can easily handle printing photographs. With this in mind, two of the largest manufacturers in this area have decided to put the focus back on the ink rather than the printer itself, coming up with a couple innovative and distinct approaches. In this feature, we'll compare HP's new Instant Ink service against Epson's EcoTank system to see which one offers the best value and performance for your money.

HP Instant Ink

HP recently introduced a subscription service called Instant Ink. For a monthly fee, you can print a set number of pages, some of which can be carried over into the next month if you don't use them. The basic package costs £1.99 for 50 pages, but there are two other tiers which will set you back £3.49 (100 pages) and £7.99 (300 pages). All have allowances for extra pages if you hit your limit, but you'll pay £1 for a set amount linked to your plan, with the lowest being 15 additional prints on the basic package.

The cartridges themselves don't have only 50 pages worth of ink in them, so it's not a case of replacing one every month. Instead, the printer is connected to HP online and monitors your usage, so that you only print the amount you've signed up for. Then, when the printer sees you're nearing the end of a cartridge, it will let HP know and new ones will automatically be sent out to arrive before you run dry. For this to work, you'll need one of the wide range of Instant-Ink enabled printers that HP sells. These include the very affordable HP Envy 5530 (£59 and shown opposite), right up to the more expensive HP Officejet Pro 8610 (£179).



HP Envy 5530 (above) and cartridges (right)

Epson EcoTank

In contrast to HP's model of topping up as you go along, Epson has instead designed the EcoTank system which, according to the company, holds enough ink for two years of printing. The EcoTank range of printers have a module on the side that contains four reservoirs which are filled with different coloured ink. When these eventually run out you can replace each colour separately for £7.99 per 70ml bottle. Obviously, the advantage of this is that if you run out of, say, blue, then you don't have to replace the whole colour cartridge. There are currently seven EcoTank printers, starting with the Epson L355 (£219.99 and pictured on page 114), the mid-range L555 and topping out with the ET-1400 (£499.99), which specialises in A3 printing.

Setting up the printers

In our testing, we used the two cheapest variants available at the time – the HP Envy 5530 and the Epson L355, each of which came with ink. Getting the HP up and running involved plugging in the cartridges, connecting the printer to the internet, then signing up to the Instant Ink service. It was all pain free and we were happy to find that the Envy 5530 has its own email address, meaning documents and photos can be sent directly to the device from a phone, tablet or Chromebook.

The Epson was a little more involved, with the four bottles of ink needing to be poured into the reservoirs. Even with great care, and using kitchen towels to hold everything, we still managed to get ink on our fingers. Once the ink was in the tank, the L355 then spent around 20 minutes drawing it into the various pipes that supply the print heads. It was a bit confusing, with no display to let you know what was happening, but the process didn't take long.



Print quality

Both printers turned out respectable results in our tests, proving themselves perfectly good home devices. The HP Instant Ink results had sharp, clear text on documents, bolstered by a new waterproofing feature that bonds the ink to the paper in a clever fashion. The upshot of this was that if someone accidentally spilled water onto a page, the print remained virtually untouched. After leaving the document to dry for around twenty minutes we found an almost pristine copy, with only the crinkling of the paper itself revealing anything had happened. Trying the same thing with the Epson ink gave more traditional swelling and darkening of the text. It was still readable, but much more noticeable.

With photographs there was a distinctly different flavour in both camps. Epson's output favoured a darker treatment of colours, and the contrast seemed higher than the HP offerings. This gave images a more grainy, at times pale, tone, but felt sharp in detail. HP seems to subscribe to the heavily saturated approach that Apple and Samsung use on their smartphone cameras. Images popped with vibrant hues, which looked good but weren't entirely accurate, and in some instances a little too enthusiastic. On both platforms, we noticed pale bands in the prints at times, possibly where a nozzle head isn't delivering ink correctly to the page. It wasn't often, but it was there. The Epson also had the strange tendency to deposit slight ink marks at the bottom of text documents from time to time, which we put down to an error with the unit itself.

Running costs

Epson and HP have set out two interesting ways of paying for your printing needs. All up front with Epson; pay as you go with HP. So which one offers the best value depends on the way you print.



Epson's EcoTank system (left) and 70ml refills (right)



Epson L355

With figures suggesting that the average home printer usually has to produce around 55 pages a month, the 50 offered by HP seems fair, especially for such a small amount of money. So if you fall into the category of casual user, maybe with children who print off items for homework, and the occasional need for reports of letters, then the basic package could well suit your needs. The real crown in HP's hat though, is that those 50 pages can be anything at all. If you want to knock out 40 A4 glossy colour photographs, they count just the same as a single text page. Conversely, those last pages of documents that only have a line or so at the top of the page actually become more costly under this scheme. As we said, it's all down to how you use it.

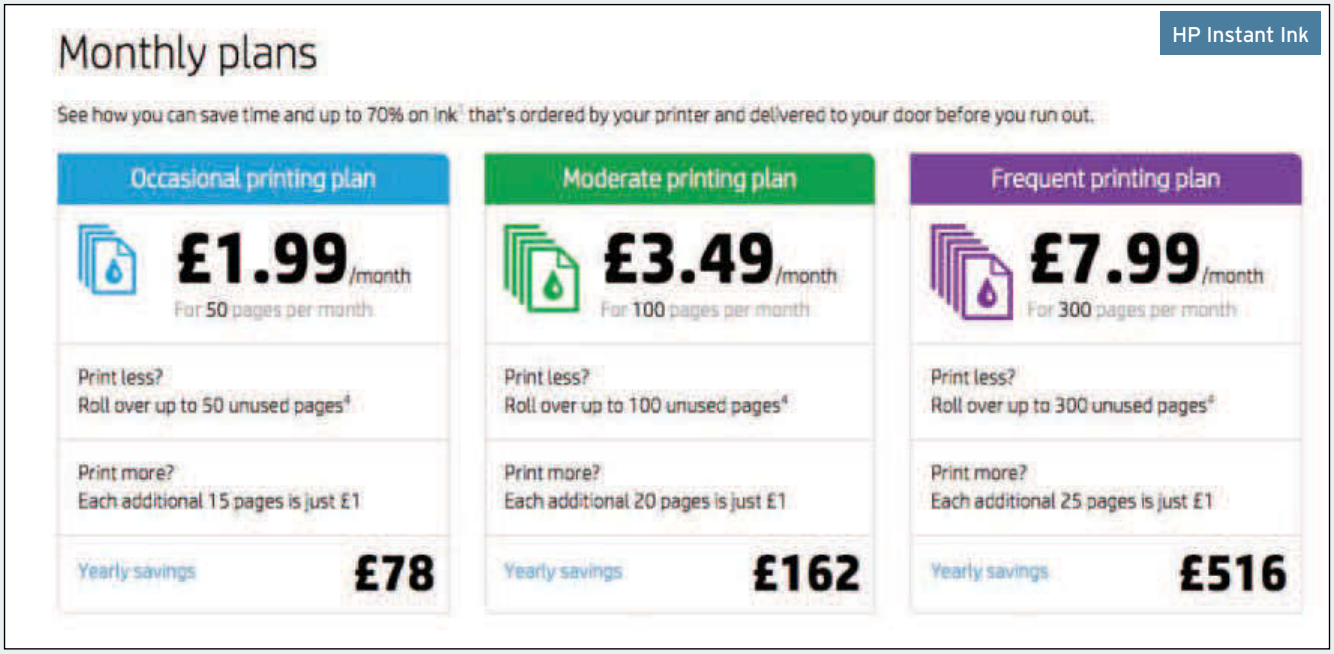
If you bought the HP Envy 5530 for £59 (which comes with two months free Instant Ink) and paid the basic package of £1.99 for 50 pages per month, your total cost over two years would be just shy of £103 for 1,200 pages, or 9p per page. If that wasn't enough, the 100 page plan (£3.49 per month) would work out at around £136 for 2400 pages, or 6p per page.

With the Epson approach, you front load the cost, so that it's £219.99 for two years of printing. This doesn't mean that it's more expensive than the HP route though, as Epson claims the supplied 70ml bottles of ink can print 4,000 black text documents and 6,500 colour ones, making a general cost of 2p per page. Replenishing the bottles costs £7.99 per colour, which works out at a total of £31.96 every two years dependent on your usage. One thing to bear in mind though, is that ink degrades over time, and the Epson system does seem to require more maintenance. In our test period, we had to clean the Epson print heads six times to keep it running properly. This is an automated process, but still needs to be considered.

Conclusion

There are pros and cons to both of these systems. The Epson has a higher entry point of cost and is a lot more fiddly to set up. Results were good, if not exceptional, but we're not convinced that the low-end printers are going to last in the long run. Thankfully, there are higher specified models to choose from if you're willing to invest.

For ease of use, low entry cost, and the freedom to print photos with a little more alacrity, the HP Instant Ink comes out on top for us. We like the idea of knowing what we can print, and not having to rush out when the printer starts to run dry. In some ways it's a little more expensive, but the costs are manageable and you can, of course, always cancel the subscription at any time and put non-HP cartridges in the printer instead. ☒



HP Instant Ink

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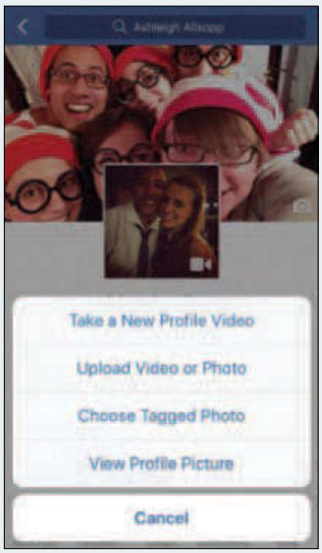
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Add video as your Facebook profile picture

Facebook's iOS app now lets you add a video as your profile picture. Ashleigh Allsopp reveals how

START First, open the Facebook app on your iOS device and go to your profile. You'll see that your profile picture has a flashing camera/video camera icon in the bottom righthand corner. Tap this and you'll be given a number of options, including Take a New Profile Video and Upload a Video or Photo.



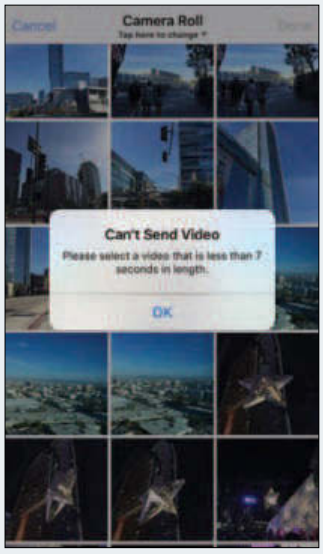
2 If you choose to take a new profile video, you'll be taken to the camera app. Tapping the red button will start the recording, which will capture whatever's onscreen for seven seconds after an initial three-second countdown. That video will then play on a loop, so you can preview what it will look like on your home page. If you're happy, tap next.



3 You'll now be able to select a thumbnail. We've opted for a light-up rubber duck. Tap Save to finish. Now whenever someone visits your profile on their iOS device or their computer, they'll see your profile video. Unfortunately, anyone using an Android device will be unable to view your video, though we expect this to change soon.



4 If you want to upload a video, it'll need to be under seven seconds in length, so annoyingly you'll need to edit it first. We hope Facebook will add this option soon. ☒



PC ADVISOR DOWNLOADS ZONE

Welcome to the *PC Advisor* Software Downloads Zone

You've probably noticed that there's no cover disc with this month's issue. We've taken the hard decision to remove the disc and move to online downloads.

Most software developers distribute their programs online rather than on CDs or DVDs. And more often than not in the past, developers required *PC Advisor* readers to use online registration, and increasingly demanded that software be downloaded rather than allowing them to be included on the cover disc. So despite there being a disc taped to the cover, there would often be little more than a link to download the software.

For these reasons, we've created a new Downloads Zone on our website. And to make things as easy as possible, we have removed the need for individual codes to download or register each program.

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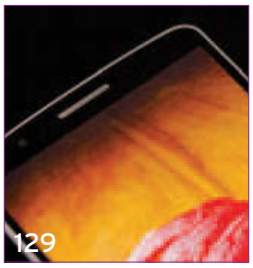

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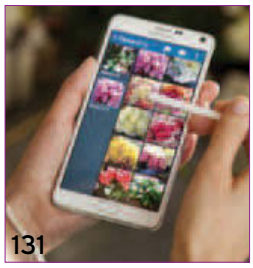

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Star ratings and Gold, Recommended and Best Buy badges are awarded at the time of the original review and given in relation to the market competition at that time.

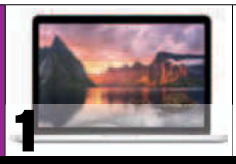
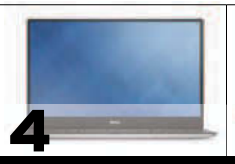
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	Aorus X7 v2	**Alienware 13**	**Apple MacBook Pro Retina 15in**	**HP EliteBook Folio 1040 G1**	**Apple MacBook Pro Retina 13in**
Price	**£1,720 inc VAT**	**£1,100 inc VAT**	**£1,599 inc VAT**	**£2,116 inc VAT**	**£999 inc VAT**
Website	Aorus.com	Alienware.co.uk	Apple.com/uk	Hp.com/uk	Apple.com/uk
Build rating	★★★★☆	★★★★½	★★★★½	★★★★½	★★★★½
Features rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★½☆
Performance rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★★☆
Value rating	★★★½☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★½
Processor	2.4GHz Intel Core i7-4860HQ	2.4GHz Intel Core i7-5500U	2.2GHz Intel Core i7	2.1GHz Intel Core i5-4600U	2.7GHz dual-core Intel Core i5
RAM	16GB DDR3	8GB (2x 4GB) DDR3	16GB DDR3L	8GB DDR3L	8GB LPDDR3
Storage	1TB HDD, 3x 128GB SSD	256GB SSD	256GB SSD	256GB SSD	128GB SSD
Screen size	17.3in matt	13.3in matt	15.4in matt	14in matt	13.3in matt
Screen resolution	1920x1080	1920x1080	2880x1800	1920x1080	2560x1600
Graphics	2x nVidia GeForce GTX 860M	nVidia GeForce GTX 860M	Intel Iris Pro Graphics	Intel HD Graphics 4400	Intel Iris Graphics 6100
Video memory	8GB	2GB	N/A	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11ac	802.11a/b/g/n/ac	802.11a/b/g/ac	802.11a/b/g/n/ac
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 2x USB 2.0	3x USB 3.0	2x USB 3.0	2x USB 3.0	2x USB 3.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	✓	×	×
DisplayPort	✓	✓	×	✓	×
HDMI	✓	✓	✓	×	✓
DVI	×	×	×	×	×
VGA	✓	×	×	×	×
eSATA	×	×	×	×	×
Media card slot	✓	×	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	HD webcam	2Mp webcam	720p FaceTime	0.9Mp webcam	720p FaceTime
Operating system	Windows 8.1 64-bit	Windows 8.1	OS X Yosemite	Windows 7 Professional	OS X Yosemite
Bundled software	None	None	None	None	None
Gaming scores	189/157fps in Tomb Raider	89/64fps in Tomb Raider	Not tested	49/33fps in Tomb Raider	Not tested
Battery	74.7Wh lithium-polymer	52Wh lithium-polymer	74.9Wh lithium-ion	42Wh lithium-polymer	74.9Wh lithium-ion
Battery life	1 hr 48 mins	10 hrs 20 mins	8 hrs 58 mins	5 hrs 41 mins	17 hrs 5 mins
PCMark7 score	6304	5429	Not tested	4783	Not tested
Dimensions	425x303x24.5mm	328x235x26.7mm	358.9x247.1x18mm	338x232x17.3mm	314x219x18mm
Weight	3.2kg	2kg	2kg	1.6kg	1.6kg
Warranty	2-year return-to-base	1-year collect-and-return	1-year return-to-base	2-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/KLUXLGE	TINYURL.COM/O8VXAGL	TINYURL.COM/O6U4NCR	TINYURL.COM/OWV2FRR	TINYURL.COM/NG98LD4

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Best budget laptops	1 	2 PC ADVISOR RECOMMENDED 	3 PC ADVISOR RECOMMENDED 	4 	5 
	Asus X555LA-XX290H	**Toshiba Chromebook 2**	**Dell Vostro 15**	**Toshiba Satellite CL10-B-100**	**Acer Chromebook 13**
Price	**£300 inc VAT**	**£269 inc VAT**	**£442 inc VAT**	**£200 inc VAT**	**£219 inc VAT**
Website	Asus.com/uk	Toshiba.co.uk	Dell.co.uk	Toshiba.co.uk	Acer.co.uk
Build rating	★★★½☆	★★★★☆	★★★½☆	★★★★☆	★★★★☆
Features rating	★★★½☆	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Performance rating	★★★½☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★½☆☆	★★★★☆
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	1.9GHz Intel Core i3-4030U	Intel Celeron	2.2GHz Intel Core i5-5200U	100	2.1GHz nVidia Tegra K1
RAM	4GB DDR3	4GB DDR3	4GB DDR3	2GB DDR3	4GB DDR3
Storage	1TB HDD	16GB SSD	500GB SSD	32GB eMMC	32GB SSD
Screen size	15.6in glossy	13.3in IPS	15.3in matt	11.6in glossy	13.3in
Screen resolution	1366x768	1920x1080	1366x768	1366x768	1920x1080
Graphics	Intel HD Graphics 4400	Intel HD Graphics	Intel HD Graphics 5000	Intel HD Graphics	nVidia Kepler
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11a/b/g/n/ac	802.11b/g/n/ac	802.11b/g/n	802.11a/b/g/n/ac
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x USB 2.0	2x USB 3.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	✓	×	×	×	×
eSATA	×	×	×	×	×
Media card slot	×	✓	✓	×	✓
Audio	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack
Optical drive	DVD writer	None	None	None	None
Extras	Kensington lock slot, webcam	Webcam	Kensington lock slot, webcam	Kensington lock slot, webcam	Webcam
Operating system	Windows 8.1	Google Chrome OS	Windows 8.1	Windows 8.1 with Bing	Google Chrome OS
Bundled software	None	None	None	None	None
Battery	37Wh Lithium-ion	Not specified	40Wh Lithium-polymer	26Wh Lithium-ion	Not specified
Battery life	5 hrs 17 mins	9 hrs	5 hrs 17 mins	6 hrs	9 hrs 20 mins
PCMark 8 Home score	1985	Not tested	2296	Not tested	Not tested
Batman (Low/High)	30fps/Not tested	Not tested	29fps/Not tested	Not tested	Not tested
Dimensions	381x257x26.3mm	320x214x19.3mm	1378x259x24.5mm	315x216x20.3mm	18x327x227.5mm
Weight	2.1kg	1.4kg	2.4kg	1.1kg	1.5kg
Warranty	1-year return-to-base	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OMYZQJ3	TINYURL.COM/OP9NQAY	TINYURL.COM/NDAX6WT	TINYURL.COM/OQC4PUO	TINYURL.COM/Q2YT5AD

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Best ultraportable laptops	 1	 2	 3	 4	 5
	Apple MacBook Pro Retina 13in	HP EliteBook Folio 1040 G1	Apple MacBook Air 13in	Dell XPS 13 9343	Microsoft Surface Pro 3
Price	**£999 inc VAT**	**£2,116 inc VAT**	**£849 inc VAT**	**£1,099 inc VAT**	**£639 inc VAT**
Website	Apple.com/uk	Hp.com/uk	Apple.com/uk	Dell.co.uk	Microsoft.com/en-gb
Build rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★½
Features rating	★★★½☆	★★★★½	★★★★☆	★★★★☆	★★★★½
Performance rating	★★★★☆	★★★★½	★★★★☆	★★★★½	★★★★☆
Value rating	★★★★☆	★★★☆☆	★★★★☆	★★★★½	★★★½☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	2.7GHz Intel Core i5	2.1GHz Intel Core i5-4600U	1.6GHz Intel Core i5	2.4GHz Intel Core i7-5500U	Intel Haswell Core i3
RAM	8GB LPDDR3	8GB DDR3L	4GB LPDDR3	8GB DDR3	4GB DDR3
Storage	128GB SSD	256GB SSD	128GB SSD	256GB SSD	64GB SSD
Screen size	13.3in matt	14in matt	13.3in glossy	13.3in IPS	12in ClearType
Screen resolution	2560x1600	1920x1080	1440x900	3200x2000	2160x1440
Graphics	Intel Iris Graphics 6100	Intel HD Graphics 4400	Intel HD Graphics 6000	Intel HD Graphics 5500	Intel HD Graphics 4400
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/ac	802.11a/b/g/n/ac	802.11ac	802.11a/b/g/n/ac
Ethernet	Gigabit	Gigabit	None	Gigabit	None
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	2x USB 3.0	1x USB 3.0
FireWire	×	×	✓	×	×
Thunderbolt	×	×	✓	×	×
DisplayPort	×	✓	×	×	✓
HDMI	✓	×	×	×	×
DVI	×	×	×	×	×
VGA	×	×	×	×	×
eSATA	×	×	×	×	×
Media card slot	✓	✓	✓	✓	×
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	720p FaceTime	0.9Mp webcam	720p FaceTime	720p webcam	5Mp webcam
Operating system	OS X Yosemite	Windows 7 Professional	OS X Yosemite	Windows 8.1 64-bit	Windows 8.1 Pro
Bundled software	None	None	None	Microsoft Office 2013 Trial	None
Gaming scores	Not tested	49/33fps in Tomb Raider	Not tested	40fps Batman: Arkham City	Not tested
Battery	74.9Wh lithium-ion	42Wh lithium-polymer	38Wh lithium-ion	52Wh lithium-polymer	8000mAh lithium-ion
Battery life	17 hrs 5 mins	5 hrs 41 mins	12 hrs 49 mins	6 hrs 12 mins	9 hrs
PCMark 7 score	Not tested	4783	Not tested	Not tested	Not tested
Dimensions	314x219x18mm	338x232x17.3mm	300x192x17mm	304x200x15mm	292x201.3x9.1mm
Weight	1.6kg	1.6kg	1.4kg	1.3kg	0.8kg
Warranty	1-year return-to-base	2-year return-to-base	1-year return-to-base	1-year next business day	1-year return-to-base
FULL REVIEW	TINYURL.COM/NG98LD4	TINYURL.COM/OWV2FRR	TINYURL.COM/PH3YN5K	TINYURL.COM/PPD3BYW	TINYURL.COM/OLDJ9KK

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Best Chromebooks	 1	 2	 3 PC ADVISOR RECOMMENDED	 4 PC ADVISOR RECOMMENDED	 5
	Toshiba Chromebook 2	Acer Chromebook 13	Dell Chromebook 11	HP Chromebook 14	Acer C720p Chromebook
Price	£269 inc VAT	£219 inc VAT	£239 inc VAT	£259 inc VAT	£249 inc VAT
Website	Toshiba.co.uk	Acer.co.uk	Dell.co.uk	Hp.com/uk	Uk.asus.com
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	Intel Celeron	2.1GHz nVidia Tegra K1	1.4GHz Intel Celeron 2955U	1.4GHz Intel Celeron 2955U	1.4GHz Intel Celeron 2955U
RAM	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3	2GB DDR3
Storage	16GB SSD	32GB SSD	16GB SSD	16GB SSD	16GB SSD
Screen size	13.3in IPS	13.3in	11.6in glossy	14in glossy	11.6in glossy
Screen resolution	1920x1080	1920x1080	1366x768	1366x768	1366x768
Graphics	Intel HD graphics	nVidia Kepler	Intel HD Graphics	Intel HD graphics	Intel HD graphics
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	1x USB 3.0, 1x USB 2.0	2x USB 3.0	2x USB 3.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	×	×	×	×	×
eSATA	×	×	×	×	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack
Optical drive	None	None	None	None	None
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Google Chrome OS	Google Chrome OS	Google Chrome OS	Google Chrome OS	Google Chrome OS
Bundled software	None	None	None	None	None
Battery life	9 hrs	9 hrs 20 mins	7 hrs 17 mins	7 hrs 50 mins	6 hrs 7 mins
SunSpider score	Not tested	660ms	465ms	470ms	502ms
Peacekeeper score	Not tested	Not tested	2468	2478	2453
Browsermark score	Not tested	Not tested	3732	3643	3698
Dimensions	320x214x19.3mm	18x327x227.5mm	295x201x24mm	20.5x345x239mm	19.1x288x204mm
Weight	1.4kg	1.5kg	1.3kg	1.7kg	1.4kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OP9NQAY	TINYURL.COM/Q2YT5AD	TINYURL.COM/M3D3QJ4	TINYURL.COM/OCU7FTY	TINYURL.COM/O9KFZMA

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2 PC ADVISOR RECOMMENDED



3



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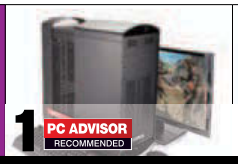
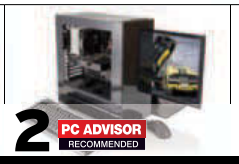


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	Aorus X7 v2	Alienware 13	Asus G751T-T717H	MSI GS60 2QD-470UK	MSI GE62 2QD Apache Pro
Price	**£1,720 inc VAT**	**£1,100 inc VAT**	**£1,559 inc VAT**	**£1,299 inc VAT**	**£999 inc VAT**
Website	Aorus.com	Alienware.co.uk	Asus.com/uk	UK.msi.com	UK.msi.com
Build rating	★★★★☆	★★★★½	★★★★½	★★★★☆	★★★★☆
Features rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Performance rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Value rating	★★★½☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Processor	2.4GHz Intel Core i7-4860HQ	2.4GHz Intel Core i7-5500U	2.3GHz Intel Core i7-4850HQ	2.6GHz Intel Core i7-4720HQ	2.6GHz Intel Core i7-4720HQ
RAM	16GB DDR3	8GB (2x 4GB) DDR3	24GB (3x 8BG) DDR3	16GB (2x 8BG) DDR3	8GB DDR3
Storage	1TB HDD, 3x 128GB SSD	256GB SSD	1TB HDD, 256GB SSD	1TB HDD, 128GB SSD	128GB SSD, 1TB HDD
Screen size	17.3in matt	13.3in matt	17.3in matt	15.6in matt	15.6in matt
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	2x nVidia GeForce GTX 860M	nVidia GeForce GTX 860M	nVidia GeForce GTX 970M	nVidia GeForce GTX 965M	nVidia GeForce GTX 960M
Video memory	8GB	2GB	Not specified	3GB	8GB
Wireless	802.11a/b/g/n/ac	802.11ac	802.11ac	802.11ac	802.11ac
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 2x USB 2.0	3x USB 3.0	4x USB 3.0	3x USB 3.0	3x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	✓	×	×
DisplayPort	✓	✓	×	×	✓
HDMI	✓	✓	✓	×	×
DVI	×	×	×	×	×
VGA	✓	×	✓	×	×
eSATA	×	×	×	×	×
Media card slot	✓	×	×	✓	×
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	HD webcam	2Mp webcam	Integrated webcam	2.1Mp webcam	720p webcam
Operating system	Windows 8.1 64-bit	Windows 8.1	Windows 8.1	Windows 8.1	Windows 8.1
Bundled software	None	None	None	None	None
Gaming scores	189/157fps in Tomb Raider	89/64fps in Tomb Raider	115/95fps in Tomb Raider	123/82fps in Tomb Raider	51/33fps in Tomb Raider
Battery	74.7Wh lithium-polymer	52Wh lithium-polymer	90Wh lithium-ion	48Wh lithium-ion	50Wh lithium-polymer
Battery life	1 hr 48 mins	10 hrs 20 mins	3 hrs 9 mins	2 hrs 49 mins	2 hrs 58 mins
PCMark 7 score	6304	5429	Not tested	6241	2895 (PCMark 8)
Dimensions	425x303x24.5mm	328x235x26.7mm	389x265x20.3mm	389x265x20.3mm	387x258x27.8mm
Weight	3.2kg	2kg	416x318x39-82mm	2kg	2.4kg
Warranty	2-year return-to-base	1-year collect-and-return	1 year	2-year return-to-base	2-year return-to-base
FULL REVIEW	TINYURL.COM/KLUXLGE	TINYURL.COM/O8VXAGL	TINYURL.COM/NGNVC6Q	TINYURL.COM/O6Q3JJD	TINYURL.COM/NHTD2TW

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Best gaming PCs

	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3	4	5 PC ADVISOR RECOMMENDED
	 Eclipse SuperNova i5r285oc	 Dino PC Dark Spark GTX 960	 Cyberpower Infinity Achilles	 Chillblast Fusion Mantis	 Yoyotech Warbird Gam3r
Price	**£999 inc VAT**	**£999 inc VAT**	**£999 inc VAT**	**£749 inc VAT**	**£999 inc VAT**
Website	Eclipsecomputers.com	Dinopc.com	Cyberpowersystem.co.uk	Chillblast.com	Yoyotech.co.uk
Build rating	★★★★★	★★★★½	★★★★½	★★★★½	★★★★★
Features rating	★★★★★	★★★★★	★★★★½	★★★☆☆	★★★★½
Performance rating	★★★★☆	★★★★☆	★★★★½	★★★½☆	★★★★½
Value rating	★★★★☆	★★★★☆	★★★½☆	★★★★★	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Processor	3.5GHz Intel Core i5-4690K (OC 4.4GHz)	3.5GHz Intel i5-4670K (OC 4.6GHz)	3.5GHz Intel Core i5-4690K	3.5GHz Intel Core i5-4690K (OC 4.2GHz)	3.5GHz Intel Core i5 4690K (4.2GHz OC)
CPU cooler	Zalman CNPS11X Extreme	Be Quiet Pure Rock BK009	Cooler Master Seidon 120mm RL-S12M-FLNN-S1	Corsair H55 Water Cooler	SilentiumPC Fera 2 Heatpipe Cooler
Memory	16GB HyperX Savage	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	2TB HDD + 250GB SSD	1TB HDD + 120GB SSD	1TG HDD + 120GB SSD	1TB SSHD	2TB HDD + 240GB SSD
Power supply	550W XFX Core Edition	450W Corsair	600W Cooler Master	600W Corsair	600W Aerocool Integrator
Motherboard	Asus Z97-K	Gigabyte Z97X-Gaming 3	Gigabyte H81M-S2H	Gigabyte Z97-HD3	MSI Z97M-G43
Operating system	Windows 8.1	Windows 8.1	Windows 8.1	Windows 8.1 64-bit	Windows 8.1
Screen	26in HKC 2615	24in Iiyama GE2488HS-B1	24in AOC E2470SWDA	None supplied	23.6in AOC I2476VWM
Graphics	XFX AMD Radeon R9 285 DD Edition	Palit nVidia GeForce GTX 690	MSI nVidia GeForce GTX 970	MSI GeForce GTX 960	MSI nVidia GTX970 4GB
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
Ports	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 4x USB 2.0, 2x PS/2, D-Sub, DVI-D, 6x SATA	6x USB 3.0, 3x USB 2.0, 2x DVI, HDMI, DP	6x USB 3.0, 2x USB 2.0, 2x DVI, HDMI, DP, PS/2	6x USB 3.0, 2x USB 2.0
Optical drive	Samsung DVD±RW	None	None	None	DVD±RW
Case	XFX Type 1 Bravo	NZXT Source 340	NZXT Source 340 Black	NZXT Source 340	CIT Kube Case
Keyboard & mouse	Cooler Master Storm Devastator Set	Corsair	Cooler Master Devastator Keyboard and Mouse	None	Gamdias Ares Keyboard and Mouse
Other	None	Corsair Raptor Bundle	None	Chillblast Family Software pack (optional)	None
PCMark 7 score	7931	7090	5945	5823	6244
Alien vs Predator score (720p/1080p)	111.4/59.8fps	103.4/54.7	167.8/89fps	104.2/55.2fps	1169.2/89.6fps
Final Fantasy XIV (Maximum)	91fps	86fps	120fps	86fps	137fps
Sniper Elite V2 (Low/Medium/Ultra)	292.1/106.8/26.5fps	285.6/123.6/28.9fps	281.1/192.9/48.1fpsfps	289.3/123.8/29fps	429.4/204.3/49.1fps
Power Consumption	76/432W	77/310W	48/261W	50/277W	72/369W
Warranty	3-year return-to-base	3-year PromoCare	2-year parts, 3-year return-to-base, 30-day C&R	5-year labour (2-year collect-and-return)	1-year RTB (3-year labour only), 90-day C&R
FULL REVIEW	TINYURL.COM/K5AJLBO	TINYURL.COM/MVBK6KX	TINYURL.COM/KKKRXAD	TINYURL.COM/L5H9ZDR	TINYURL.COM/NWZZZBM

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All-in-one PCs

	1 PC ADVISOR RECOMMENDED	2	3	4	5
	 Apple iMac with 5K display	 Acer Aspire AZ3-615	 Chillblast Volante AIO	 Asus Eee Top	 HP Envy Beats 23-n001na
Price	**£1,999 inc VAT**	**£799 inc VAT**	**£1,299 inc VAT**	**£799 inc VAT**	**£900 inc VAT**
Website	Apple.com/uk	Acer.co.uk	Chillblast.com	Asus.com/uk	Hp.com/uk
Build rating	★★★★★	★★★½☆	★★★☆☆	★★★½☆	★★★★☆
Features rating	★★★★★	★★½☆☆	★★★★☆	★★★★☆	★★★☆☆
Performance rating	★★★★☆	★★★½☆	★★★★★	★★½☆☆	★★½☆☆
Value rating	★★★★½	★★★★☆	★★★★☆	★★★☆☆	★★★½☆
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.9GHz Intel Core i5-4690	2.7GHz Intel Core i5-4460T	4GHz Intel Core i7-4790S	2.6GHz Intel Core i5-4200U	3.2GHz Intel Core i7-4785T
RAM	8GB DDR3	8GB DDR3	16GB DDR3	6GB DDR3	8GB DDR3
Storage	1TB Fusion Drive	1TB HDD	1TB SSD	1TB HDD	1TB HDD
Screen	27in	23in touchscreen	24in	23in touchscreen	23in touchscreen
Screen resolution	5120x2880	1920x1080	1920x1080	1920x1080	1920x1080
Graphics card	AMD Radeon M9 M290X	nVidia GeForce GT 840M	nVidia GeForce GT 750M	Intel HD Graphics 4400	Intel HD Graphics 4600
Video memory	2GB	2GB	2GB	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	×	×	×	×	×
USB	4x USB 3.0	2x USB 3.0, 3x USB 2.0	4x USB 3.0, 2x USB 2.0	3x USB 3.0, 3x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	✓	×	×	×	×
HDMI	×	×	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Optical drive	None	DVD Writer	Blu-Ray Combo	DVD Writer	DVD Writer
Other	Final Cut Pro X, Logic Pro X, Aperture	1Mp webcam, wireless keyboard and mouse	Logitech MK520 wireless keyboard and mouse	2Mp webcam, Freeview TV, wireless keyboard and mouse	Wireless keyboard and mouse, Beats Audio stereo speaker system (8x 12W)
Operating system	OS X Yosemite	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Power consumption (idle/max)	46/215W	46/91W	35/177W	33/69W	43/81W
Sniper V2 Elite (Low/High/Ultra)	Not tested	47.7/18.7/5.1fps	91.5/41.2/10.5fps	31.4/7.8/5fps	27.7/7.4/5fps
PCMark 8 Home score	Not tested	2906	3776	2828	2702
Dimensions	650x203x516mm	540x489x579mm	585x200x450mm	571x359x50-214mm	563x143x413mm
Weight	9.54kg	8.8kg	14.6kg	9kg	8.4kg
Warranty	1-year return-to-base	Not specified	5-year labour (2-year collect-and-return)	1-year return-to-base	1-year limited parts, labour, and pickup-and-return service
FULL REVIEW	TINYURL.COM/NWJUJSF	TINYURL.COM/QEY8FOE	TINYURL.COM/LO8A5MC	TINYURL.COM/PRPHC7L	TINYURL.COM/O6M4BCN

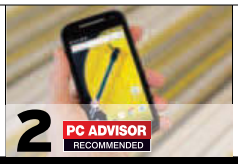
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Best smartphones

	1 PC ADVISOR RECOMMENDED	2	3 PC ADVISOR GOLD	4 PC ADVISOR RECOMMENDED	5
	Samsung Galaxy S6	Samsung Galaxy Note5	Sony Xperia Z3 Compact	LG G4	Sony Xperia Z5
Price	£349 inc VAT	£600 inc VAT	£349 inc VAT	£500 inc VAT	£549 inc VAT
Website	Samsung.com/uk	Samsung Galaxy Note 5	Sony.co.uk	Lg.com/uk	Sony.co.uk
Build rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★½
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★½
Performance rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★★	★★★★½	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
OS (out of box)	Android 5.0 Lollipop	Android 5.1.1 Lollipop	Android 4.4 KitKat	Android 5.1 Lollipop	Android 5.1 Lollipop
Processor	2.1GHz Exynos 7420	2.1GHz Exynos 7420	2.5GHz Snapdragon 801	Snapdragon 808 six-core	Snapdragon 810 octa-core
RAM	3GB	4GB	2GB	3GB	3GB
Storage	32/64GB	32/64GB	16GB	32GB	32GB
MicroSD support	×	×	Up to 128GB	Up to 128GB	Up to 200GB
Graphics	Mali-T760 GPU	Mali-T760MP8	Adreno 330	Adreno 418	Adreno 430
Screen size	5.1in	5.7in	4.6in	4.5in	5.2in
Screen resolution	1440x2560	720x1280	720x1280	1440x2560	1080x1920
Pixel density	577ppi	518ppi	319ppi	538ppi	424ppi
Screen technology	Super AMOLED	Super AMOLED	IPS	IPS	IPS
Front camera	5Mp	5Mp	2.2Mp	8Mp	5.1Mp
Rear camera	16Mp, LED flash	16Mp, LED flash	20.7Mp, LED flash	16Mp	23Mp
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Nano-SIM	Nano-SIM	Nano-SIM	Micro-SIM	Nano-SIM
Dual-SIM as standard	×	×	×	×	×
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth	Bluetooth 4.1	Bluetooth 4.2	Bluetooth 4.0	Bluetooth 4.1	Bluetooth 4.1 (aptX)
GPS	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
NFC	✓	✓	✓	✓	✓
USB OTG	✓	✓	✓	✓	✓
Extra features	Heart-rate sensor, fingerprint scanner	Heart-rate sensor, fingerprint scanner	Waterproof, PS4 Remote Play	24-bit/192kHz audio, rear key	FM radio with RDS, fingerprint scanner
Geekbench 3.0 (single)	1347	1497	Not tested	Not tested	Not tested
Geekbench 3.0 (multi)	4438	Not tested	2800	3513	4212
SunSpider	1048ms	718ms	944ms	715ms	644ms
GFXBench: T-Rex	30fps	37fps	41fps	25fps	53fps
GFXBench: Manhattan	14fps	15fps	26fps	9fps	26fps
Battery	2550mAh, non-removable	23000mAh, non-removable	2600mAh, non-removable	3000mAh removable	2900mAh, non-removable
Dimensions	143.4x70.5x6.8mm	153.2x76.1x7.6mm	64.9x127x8.6mm	64.9x127x8.6mm	72x146x7.3mm
Weight	138g	171g	129g	155g	154g
Warranty	1 year	1 year	2 years	1 year	1 year
FULL REVIEW	TINYURL.COM/PC2KOYQ	TINYURL.COM/OCQAJPL	TINYURL.COM/NBBUY82	TINYURL.COM/ORQ82MS	TINYURL.COM/OECLUGK

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Best budget smartphones

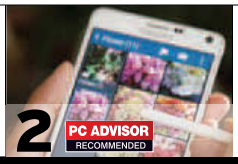
	1	2	3	4	5
					
	Vodafone Smart Ultra 6	**Motorola Moto E 4G 2015**	**Vodafone Smart Prime 6**	**Wileyfox Swift**	**EE Harrier Mini**
Price	**£125 inc VAT**	**£109 inc VAT**	**£79 inc VAT**	**£129 inc VAT**	**£99 inc VAT**
Website	Vodafone.co.uk	Motorola.co.uk	Vodafone.co.uk	Wileyfox.com	EE.co.uk
Build rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Performance rating	★★★★½	★★★★☆	★★★★★	★★★½☆	★★★½☆
Value rating	★★★★★	★★★★★	★★★★☆	★★★★½	★★★★½
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
OS (out of box)	Android 5.0.2 Lollipop	Android 5.0 Lollipop	Android 5.0.2 Lollipop	Cyanogen OS	Android 5.0 Lollipop
Processor	2.5GHz Snapdragon 615	1.2GHz Snapdragon 410	1.2GHz Snapdragon 410	1.2GHz Snapdragon 410	1.2GHz
RAM	2GB	1GB	1GB	2GB	1GB
Storage	16GB	8GB	8GB	16GB	8GB
MicroSD support	Up to 128GB	Up to 32GB	Up to 64GB	Up to 32GB	Not specified
Graphics	Adreno 405	Adreno 306	Adreno 306	Adreno 306	Not specified
Screen size	5.5in	4.5in	5in	5in	4.7in
Screen resolution	1920x1080	540x960	720x1280	1280x720	720x1280
Pixel density	401ppi	245ppi	294ppi	294ppi	312ppi
Screen technology	IPS	IPS	IPS	IPS	IPS
Front camera	5Mp	0.3Mp	2Mp	5Mp	2Mp
Rear camera	13Mp	5Mp	8Mp	13Mp, LED flash	8Mp, LED flash
Video recording	1080p	720p	1080p	1080p	720p
Cellular connectivity	4G*	4G	4G*	4G	4G
SIM type	Nano-SIM	Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM
Dual-SIM as standard	×	×	×	×	×
Wi-Fi	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	GPS, A-GPS	GPS, A-GPS, Glonass	A-GPS	A-GPS	A-GPS, Glonass
NFC	✓	×	×	×	×
USB OTG	×	×	✓	✓	✓
Extra features	FM radio	Double-twist launches camera, lockscreen alerts	FM radio	3D G-Sensor,	Wi-Fi calling
Geekbench 3.0 (single)	649	464	464	Not tested	Not tested
Geekbench 3.0 (multi)	2469	1463	1401	1456	1549
SunSpider	1545ms	1301ms	1301ms	1760ms	1880ms
GFXBench: T-Rex	14fps	13fps	9.4fps	10fps	10fps
GFXBench: Manhattan	5.7fps	6fps	3.8fps	4fps	4fps
Battery	3000mAh, non-removable	2390mAh, non-removable	Not specified	2500mAh, removable	2000mAh, non-removable
Dimensions	154x77x9mm	66.8x5.2-12.3x129.9mm	141.65x71.89x9mm	141x71x9.4mm	138x67.9x9.5mm
Weight	159g	145g	155g	135g	124g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/Q7Q9NXR	TINYURL.COM/Q7Q9NXR	TINYURL.COM/Q5DSNHE	TINYURL.COM/PO9KG38	TINYURL.COM/PXTROH4

* Locked to Vodafone. All other models here are unlocked

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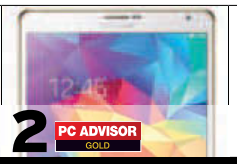




	Samsung Galaxy Note5	Samsung Galaxy Note 4	LG G4	LG G3	OnePlus 2
Price	**£600 inc VAT**	**£599 inc VAT**	**£500 inc VAT**	**£479 inc VAT**	**£239 inc VAT**
Website	Samsung Galaxy Note 5	Samsung.com/uk	Lg.com/uk	Lg.com/uk	Oneplus.net
Build rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★★☆
Features rating	★★★★☆	★★★★½	★★★★☆	★★★★½	★★★★☆
Performance rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★½	★★★★½	★★★★★
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★★☆
OS (out of box)	Android 5.1.1 Lollipop	Android 4.4 KitKat	Android 5.1 Lollipop	Android 4.4 KitKat	OxygenOS 2.0 (Android 5.1)
Processor	2.1GHz Exynos 7420	2.7GHz Snapdragon 805	1.82GHz Snapdragon 808	2.5GHz Snapdragon 801	1.8GHz Snapdragon 801
RAM	4GB	3GB	3GB	2GB/3GB	3/4GB
Storage	32/64GB	32GB	32GB	16GB/32GB	16GB/64GB
MicroSD support	×	Up to 128GB	Up to 128GB	×	×
Graphics	Mali-T760MP8	Adreno 420	Adreno 418	Adreno 330	Adreno 430
Screen size	5.7in	5.7in	5.5in	5.5in	5.5in
Screen resolution	720x1280	1440x2560	1440x2560	1440x2560	1920x1080
Pixel density	518ppi	515ppi	538ppi	534ppi	401ppi
Screen technology	Super AMOLED	Super AMOLED	IPS	IPS	IPS
Front camera	5Mp	3.7Mp	8Mp	2Mp	5Mp
Rear camera	16Mp, LED flash	16Mp, LED flash	16Mp, LED flash	13Mp, LED flash	13Mp, Dual-LED flash
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Nano-SIM	Micro-SIM	Micro-SIM	Micro-SIM	Dual-SIM
Dual-SIM as standard	×	×	×	×	Yes
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11ac, dual-band
Bluetooth	Bluetooth 4.2	Bluetooth 4.1	Bluetooth 4.0	Bluetooth 4.0 (aptX)	Bluetooth 4.0
GPS	A-GPS, Glonass	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass
NFC	✓	✓	✓	✓	×
USB OTG	✓	✓	✓	✓	✓
Extra features	Heart-rate sensor, fingerprint scanner	Fingerprint, UV, heart-rate sensors, S Pen stylus	24bit/192kHz audio, rear key, IR blaster	24bit/192kHz audio, rear key	None
Geekbench 3.0 (single)	1497	Not tested	Not tested	Not tested	Not tested
Geekbench 3.0 (multi)	Not tested	3272	3513	2465	4094
SunSpider	718ms	1367ms	715ms	959ms	1471ms
GFXBench: T-Rex	37fps	27fps	25fps	20fps	46fps
GFXBench: Manhattan	15fps	11fps	9fps	Not tested	16fps
Battery	23000mAh, non-removable	3220mAh, removable	3000mAh, removable, Qi	3000mAh, removable, Qi	3300mAh, non-removable
Dimensions	153.2x76.1x7.6mm	78.6x153.5x8.5mm	76x149x6.3-9.8mm	75x146x8.9mm	151.8x74.9x9.9mm
Weight	171g	176g	155g	149g	175g
Warranty	1 year	2 years	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OCQAJPL	TINYURL.COM/PNHJCZ4	TINYURL.COM/QDGU48T	TINYURL.COM/OA76T73	TINYURL.COM/NSGEV3U

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Best 7- & 8in tablets

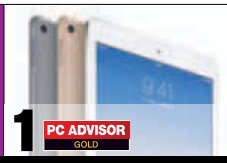
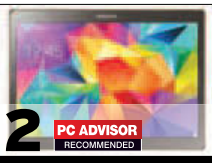
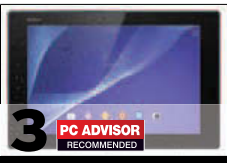






	1 PC ADVISOR GOLD	2 PC ADVISOR GOLD	3	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Google Nexus 7	Samsung Galaxy Tab S 8.4	Apple iPad mini 4	Sony Xperia Z3 Tablet Compact	Apple iPad mini 2
Price	**£199 inc VAT**	**£319 inc VAT**	**£319 inc VAT**	**£299 inc VAT**	**£219 inc VAT**
Website	Play.google.com	Samsung.com/uk	Apple.com/uk	Sony.co.uk	Apple.com/uk
Build rating	★★★★☆	★★★★☆	★★★★½	★★★★☆	★★★★½
Features rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
Performance rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★½
Value rating	★★★★½	★★★★½	★★★½☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★½
OS (out of box)	Android 4.3 Jelly Bean	Android 4.4 KitKat	iOS 9	Android 4.4 KitKat	iOS 9
Processor	1.5GHz Snapdragon S4 Pro	Exynos 5420, octa-core	Apple A8, Apple M8	2.5GHz Snapdragon 801	Apple A7, Apple M7
RAM	2GB	3GB	2GB	3GB	1GB
Storage	16GB/32GB	16GB/32GB	16GB/64GB/128GB	16GB/32GB	16GB/32GB
MicroSD support	×	Up to 128GB	×	Up to 128GB	×
Graphics	Adreno 320	ARM Mali-T628 MP6	Apple A8	Adreno 330	Apple A7
Screen size	7in	8.4in	7.9in	8in	7.9in
Screen resolution	1920x1200	2560x1440	2048x1536	1920x1200	2048x1536
Pixel density	323ppi	359ppi	326ppi	283ppi	326ppi
Screen technology	IPS	Super AMOLED	IPS	IPS	IPS
Front camera	1.2Mp	2.1Mp	1.2Mp	2.2Mp	1.2Mp
Rear camera	5Mp	8Mp, LED flash	8Mp	8.1Mp	5Mp
Video recording	1080p	1080p	1080p	1080p	7200p
Cellular connectivity	4G version available	4G version available	4G version available	4G version available	4G version available
Wi-Fi	802.11b/g/n, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	GPS, Glonass	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
NFC	✓	×	×	✓	×
USB OTG	✓	✓	×	✓	×
Fingerprint scanner	×	✓	✓	×	×
Waterproof	×	×	×	✓	×
Extra features	None	Stereo speakers	None	PS4 Remote Play, stereo speakers	None
Geekbench 3.0 (single)	Not tested	Not tested	1816	Not tested	Not tested
Geekbench 3.0 (multi)	Not tested	2765	4523	2708	Not tested
SunSpider	1136ms	1089ms	1017ms	1017ms	397ms
GFXBench: T-Rex	Not tested	14fps	Not tested	28fps	Not tested
GFXBench: Manhattan	Not tested	3fps	25fps	11fps	Not tested
Battery	3950mAh, non-removable, Qi	4900mAh, non-removable	5124mAh, non-removable	4500mAh, non-removable	6470mAh, non-removable
Dimensions	200x114x8.65mm	126x213x6.6mm	203.2x134.8x6.1mm	213x124x6.4mm	200x134.7x7.5mm
Weight	299g	294g	298.8g	270g	331g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PUJDJBY	TINYURL.COM/OUEM64Z	TINYURL.COM/PBMONMA	TINYURL.COM/NJ6VHEO	TINYURL.COM/PCJPB5L

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Best 9- & 10in tablets



	1 PC ADVISOR GOLD	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Apple iPad Air 2	Samsung Galaxy Tab S 10.5	Sony Xperia Z2 Tablet	Apple iPad Air	Google Nexus 10
Price	£399 inc VAT	£399 inc VAT	£369 inc VAT	£319 inc VAT	£389 inc VAT
Website	Apple.com/uk	Samsung.com/uk	Sony.co.uk	Apple.com/uk	Play.google.com
Build rating	★★★★★	★★★★☆	★★★★½	★★★★☆	★★★★½
Features rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Performance rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★½
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★½
OS (out of box)	iOS 8.2	Android 4.4 KitKat	Android 4.4 KitKat	iOS 8.2	Android 4.2 Jelly Bean
Processor	Apple A8X, Apple M8	Exynos 5420, octa-core	2.3GHz Snapdragon 801	Apple A7, Apple M7	1.7GHz Exynos 5250
RAM	2GB	3GB	3GB	1GB	2GB
Storage	16GB/64GB/128GB	16GB/32GB	16GB	16GB/32GB	16GB/32GB
MicroSD support	No	Up to 128GB	Up to 64GB	No	No
Graphics	Apple A8X	ARM Mali-T628 MP6	Adreno 330	Apple A7	ARM Mali T604
Screen size	9.7in	10.5in	10.1in	9.7in	10.1in
Screen resolution	2048x1536	2560x1600	1920x1200	2048x1536	2560x1600
Pixel density	264ppi	288ppi	224ppi	264ppi	300ppi
Screen technology	IPS	Super AMOLED	IPS	IPS	IPS
Front camera	1.2Mp	2.1Mp	2.2Mp	1.2Mp	1.9Mp
Rear camera	8Mp	8Mp, LED flash	8.1Mp	5Mp	5Mp, LED flash
Video recording	1080p	1080p	1080p	1080p	1080p
Cellular connectivity	4G version available	4G version available	4G version available	4G version available	No
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band	802.11b/g/n, dual-band
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	A-GPS, Glonass	GPS, Glonass	GPS, Glonass	A-GPS, Glonass	GPS, Glonass
NFC	Yes (for Apple Pay)	No	Yes	No	Yes
USB OTG	×	Yes	Yes	No	Yes
Fingerprint scanner	✓	Yes	No	No	No
Waterproof	×	No	Yes	No	No
Extra features	None	Stereo speakers	PlayStation certified	None	None
Geekbench 3.0 (single)	1816	Not tested	967	1487	Not tested
Geekbench 3.0 (multi)	4523	2769	2719	2703	Not tested
SunSpider	Not tested	1079ms	1099ms	400ms	1329ms
GFXBench: T-Rex	48fps	14fps	27fps	23fps	Not tested
GFXBench: Manhattan	Not tested	3fps	Not tested	Not tested	Not tested
Battery	7340mAh, non-removable	7900mAh, non-removable	6000mAh, non-removable	8600mAh, non-removable	9000mAh, non-removable
Dimensions	240x169.5x6.1mm	247x177x6.6mm	266x172x6.4mm	240x169x7.5mm	264x178x8.9mm
Weight	437g	465g	439g	469g	603g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PLQXWSZ	TINYURL.COM/OESDFZQ	TINYURL.COM/M8BZZUN	TINYURL.COM/NVOOF6H	TINYURL.COM/PUAG9RN

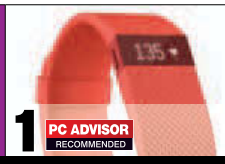
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Best smartwatches	 1 PC ADVISOR RECOMMENDED	 2 PC ADVISOR RECOMMENDED	 3	 4	 5
	LG G Watch R	**Motorola Moto 360**	**Sony Smartwatch 3**	**LG Watch Urbane**	**Asus ZenWatch**
Price	**£195 inc VAT**	**£199 inc VAT**	**£189 inc VAT**	**£259 inc VAT**	**£199 inc VAT**
Website	Lg.com/uk	Motorola.co.uk	Sony.co.uk	Lg.com/uk	Uk.asus.com
Overall rating	★★★★½	★★★★½	★★★½☆	★★★★☆	★★★½☆
Operating system	Android Wear	Android Wear	Android Wear	Android Wear	Android Wear
Compatibility	Android	Android	Android	Android	Android
Display	1.3in 320x320 P-OLED	1.56in 290x320 LCD	1.6in 320x320 LCD	1.3in 320x320 P-OLED	1.6in 320x320 AMOLED
Processor	1.2GHz Snapdrgon 400	TI OMAP 3	1.2GHz ARM V7	1.2GHz Snapdragon 400	1.2GHz Snapdragon 400
RAM	512MB	512MB	512MB	512MB	512MB
Storage	4GB	4GB	4GB	4GB	4GB
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	410mAh	320mAh	420mAh	410mAh	1.4Wh
Dimensions	46.4x53.6x9.7mm	46x11.5mm	36x51x10mm	46x52x10.9mm	51x39.9x7.9-9.4mm
Weight	62g	49g (leather band model)	45g	67g	75g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QATY8FT	TINYURL.COM/O9C69K6	TINYURL.COM/OQVZ3PN	TINYURL.COM/Q3VK7ES	TINYURL.COM/NN7GA7W

Best smartwatches	 6	 7 PC ADVISOR RECOMMENDED	 8 PC ADVISOR RECOMMENDED	 9 PC ADVISOR RECOMMENDED	 10
	Apple Watch	**Pebble Steel**	**LG G Watch**	**Sony Smartwatch 2**	**Samsung Gear 2 Neo**
Price	**£299 inc VAT**	**£179 inc VAT**	**£159 inc VAT**	**£125 inc VAT**	**£169 inc VAT**
Website	Apple.com/uk	Getpebble.com	Lg.com/uk	Sony.co.uk	Samsung.com/uk
Overall rating	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Operating system	watchOS	Proprietary	Android Wear	Proprietary	Tizen
Compatibility	iOS	iOS, Android	Android	Android	Samsung phones
Display	1.32in 340x312 Ion-X Glass	1.26in 144x168 E-Paper	1.65in 280x280 IPS	1.6in 220x176 LCD	1.6in 320x320 Super AMOLED
Processor	Apple S1	Not specified	1.2GHz Snapdragon 400	Not specified	Dual-core
RAM	512MB	512MB	512MB	Not specified	512MB
Storage	8GB	Not specified	4GB	Not specified	4GB
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	Not specified	130mAh	400mAh	Not specified	300mAh
Dimensions	38.6x33.3x10.5mm	46x34x10.5mm	37.9x46.5x9.95mm	42x41x9mm	58.8x37.9x10mm
Weight	72g	156g	63g	123g	55g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OUTH9XK	TINYURL.COM/PPBXV7J	TINYURL.COM/Q84WL6L	TINYURL.COM/P4X7AZM	TINYURL.COM/Q68FS5U

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Best activity trackers

	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
					
	Fitbit Charge HR	**Fitbit Surge**	**Fitbit One**	**Microsoft Band**	**Fitbit Charge**
Price	**£119 inc VAT**	**£199 inc VAT**	**£79 inc VAT**	**£169 inc VAT**	**£99 inc VAT**
Website	Fitbit.com/uk	Fitbit.com/uk	Fitbit.com/uk	Microsoft.com/en-gb	Fitbit.com/uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★½☆	★★★★☆
Compatibility	iOS, Android, Windows	iOS, Android, Windows	iOS, Android	iOS, Android, Windows	iOS, Android, Windows
Display	OLED	Touchscreen	OLED	TFT	OLED
Pedometer	Yes	Yes	Yes	Yes	Yes
Heart-rate monitor	Yes	Yes	No	Yes	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes	Yes
Third-party app synching	Yes	Yes	Yes	Yes	Yes
Call notifications	Yes	Yes	No	Yes	Yes
Waterproof	Yes	Yes	No	Yes	Yes
Battery life	5+ days	5 days	10-14 days	2 days	7-10 days
Dimensions, weight	21.1mm, 26g	34mm, 51g	35.5x28x9.65mm, 8g	11x33mm, 60g	21.1mm, 24g
FULL REVIEW	TINYURL.COM/PCKV4SU	TINYURL.COM/O83DR47	TINYURL.COM/PT2TC6F	TINYURL.COM/LHMQ2AC	TINYURL.COM/PFMQ9KH

Best activity trackers

	6	7 PC ADVISOR RECOMMENDED	8	9 PC ADVISOR RECOMMENDED	10
					
	Basis Peak	**Xiaomi Mi Band**	**Jawbone Up 2**	**Jawbone Up Move**	**Jawbone Up24**
Price	**£169 inc VAT**	**£29 inc VAT**	**£89 inc VAT**	**£39 inc VAT**	**£99 inc VAT**
Website	En-gb.mybasis.com	Mobilefun.co.uk	Jawbone.com	Jawbone.com	Jawbone.com
Overall rating	★★★½☆	★★★★½	★★★★☆	★★★★☆	★★★½☆
Compatibility	iOS, Android	iOS, Android	iOS, Android	iOS, Android	iOS, Android
Display	E-Ink	No	No	No	No
Pedometer	Yes	Yes	Yes	Yes	Yes
Heart-rate monitor	Yes	No	No	No	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	No	Yes	Yes	No	Yes
Third-party app synching	No	No	Yes	Yes	Yes
Call notifications	Yes	Yes	No	No	No
Waterproof	Yes	Yes	Splashproof	Splashproof	Splashproof
Battery life	4 days	30 days	7 days	Six months, non-rechargable	7 days
Dimensions, weight	33x43x10mm, 51g	157-205mm, 13g	220x11.5x3-8.5mm, 25g	27.6x27.6x9.8mm, 6.8g	S: 19g, M: 22g, L: 23g
FULL REVIEW	TINYURL.COM/LHMQ2AC	TINYURL.COM/QZ3YVCR	TINYURL.COM/PHT98ZK	TINYURL.COM/PFXQFNE	TINYURL.COM/ND8YMB8

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Best budget printers

	1	2	3	4	5 PC ADVISOR GOLD
	HP OfficeJet 3830	**Samsung Xpress M2022W**	**Brother HL-1110**	**Canon Pixma MX535**	**Canon i-Sensys LBP6230dw**
Price	**£60 inc VAT**	**£79 inc VAT**	**£59 inc VAT**	**£70 inc VAT**	**£91 inc VAT**
Website	Hp.com/uk	Samsung.com/uk	Brother.co.uk	Canon.co.uk	Canon.co.uk
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★½
Technology	Colour inkjet	Mono laser	Mono laser	Colour inkjet	Mono laser
Max print resolution	1200x1200dpi	1200x1200dpi	600x600dpi	4800x1200dpi	1200x1200dpi
Actual print speed	B=11ppm C=4ppm	B=20ppm	B=16.4ppm	B=9.7ppm C=3.8ppm	B=22.2ppm
Scan/fax facilities	None	1200x1200 scans	None	1200x2400 scans/fax	None
Supported interfaces	USB 2.0, 802.11b/g/n, AirPrint	USB 2.0, 802.11b/g/n	USB 2.0	USB 2.0, 802.11b/g/n, AirPrint	USB 2.0, 802.11b/g/n
Cost per page	B=6p C=7p	B=2p	B=2.7p	B=2.7p C=4.8p	B=2p
Media card/auto duplex	×✓	××	××	×✓	×✓
Input capacity	60 sheets	150 sheets	150 sheets	100 sheets + 30-sheet ADF	250 sheets
Dimensions	222x454x362mm	332x215x178mm	340x238x189mm	458x385x200mm	379x293x243mm
Weight	5.8kg	4kg	4.5kg	8.5kg	7kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PJ4K9D7	TINYURL.COM/PQ9JUDN	TINYURL.COM/OQE9LGJ	TINYURL.COM/N9LXVN7	TINYURL.COM/KZW8VU3

Best printers

	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR GOLD	5
	Canon Pixma MG7550	**Samsung Xpress M2835DW**	**Canon i-Sensys MF6180dw**	**Epson WorkForce Pro**	**Brother HL-L9200CDWT**
Price	**£130 inc VAT**	**£143 inc VAT**	**£320 inc VAT**	**£200 inc VAT**	**£548 inc VAT**
Website	Canon.co.uk	Samsung.com/uk	Canon.co.uk	Epson.co.uk	Brother.co.uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Technology	Colour inkjet	Mono laser	Mono laser	Colour inkjet	Colour laser
Max print resolution	9600x2400dpi	4800x600dpi	1200x600dpi	4800x1200dpi	2400x600dpi
Actual print speed	B=14.3ppm	B=22.7ppm	B=24ppm	B=18.9ppm	B=30ppm C=30ppm
Scan/fax facilities	2400x4800dpi scanner	None	600dpi scanner, 33.6Kb/s fax	None	None
Supported interfaces	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n
Cost per page	B=2.4p C=8.1p	B=1.5p	B=1.5p	B=1.1p	B=1p C=5.9p
Media card/auto duplex	×✓	×✓	×✓	×✓	×✓
Input capacity	125 sheets	250 sheets	250 + 50 sheet + 50 ADF	250 + 80 sheet	750 sheets + 50 sheet
Dimensions	435x370x148mm	368x335x202mm	390x473x431mm	3461x442x284mm	410x495x445mm
Weight	7.9kg	7.4kg	19.1kg	11.4kg	28.3kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PZ3SVH7	TINYURL.COM/QECOF7V	TINYURL.COM/LE9WA5N	TINYURL.COM/OC7FUJ3	TINYURL.COM/PT52MH6

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Best wireless routers

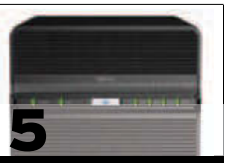
	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Apple AirPort Extreme	**Netgear Nighthawk R7000**	**TP-Link Archer VR900**	**AVM Fritz!Box 3490**	**Asus RT-AC68U AC1900**
Price	**£169 inc VAT**	**£150 inc VAT**	**£139 inc VAT**	**£135 inc VAT**	**£160 inc VAT**
Website	Apple.com/uk	Netgear.co.uk	Tp-link.com	En.avm.de	Uk.asus.com
Overall rating	★★★★☆	★★★★½	★★★★½	★★★★½	★★★★☆
Standards supported	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennas	6x internal	3x external	3x external	Internal	3x external, 3x internal
Built-in modem	×	×	✓	×	×
Manufacturer's rating	1300/450Mb/s	1300/600Mb/s	1300/600Mb/s	1300/450Mb/s	1300/600Mb/s
WPS	×	✓	✓	✓	✓
Ports	Gigabit WAN, 3x gigabit LAN, USB	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	ADSL, 4x gigabit LAN, 2x USB 3.0	Gigabit WAN, 4x gigabit LAN, 2x USB 2.0
Average power use	8W	9W	1N/A	8W	N/A
Max speed (11n/11ac)	171/572Mb/s	171/592Mb/s	146/622Mb/s	114/563Mb/s	98/610Mb/s
Dimensions, weight	98x168x98mm, 945g	285x186x45mm, 750g	245x181x90mm, 720g	190x120x60mm/Not specified	160x83x220mm, 640g
Warranty	1 year	Not specified	Not specified	Not specified	2 years
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/Q2NRQ8Q	TINYURL.COM/OF8KYPC	TINYURL.COM/PHQ34EG	TINYURL.COM/K4ZATKV

Best powerline adaptors

	1	2	3	4	5
	Solwise SmartLink 1200AV2	**TrendNet Powerline 500 AV2**	**TP-Link AV1200**	**Devolo dLan 1200+**	**Devolo dLAN 500AV**
Price	**£43 inc VAT**	**£41 inc VAT**	**£88 inc VAT**	**£119 inc VAT**	**£129 inc VAT**
Website	Solwise.com	Trendnet.com	Uk.tp-link.com	Devolo.com/uk	Devolo.com/uk
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
No of adaptors in kit	1 (2 required)	2	2	2	2
Max throughput	1200Mb/s	600Mb/s	1200Mb/s	1200Mb/s	500Mb/s
Near test result	410Mb/s	146Mb/s	500Mb/s	357Mb/s	96Mb/s
Far test result	107Mb/s	71Mb/s	200Mb/s	126Mb/s	47Mb/s
Ethernet ports	2x gigabit	1x gigabit	1x gigabit	1x gigabit	3x gigabit
Passthrough socket	Yes	No	Yes	Yes	Yes
Wireless hotspot	No	No	No	No	Yes
Encryption	128-bit	128-bit	128-bit	128-bit	128-bit
Dimensions	62x122x41mm	55x87x58mm	230x190x100mm	130x66x42mm	152x76x40mm
Weight	Not specified	90g	898g	Not specified	Not specified
Warranty	2 years	3 years	1 year	3 years	3 years
FULL REVIEW	TINYURL.COM/NZ4EJW8	TINYURL.COM/QYEPJQ7	TINYURL.COM/NVONCWT	TINYURL.COM/Q4EOO4M	TINYURL.COM/OVNPPQ7

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Best NAS drives

	1	2	3	4	5
					
	Qnap TS-421	**Synology DS115j**	**Qnap HS-210**	**WD My Cloud EX2100**	**Synology DS414j**
Price	**£320 inc VAT (diskless)**	**£83 inc VAT (diskless)**	**£190 inc VAT (diskless)**	**£205 inc VAT (diskless)**	**£270 inc VAT (diskless)**
Website	Qnap.com	Synology.com	Qnap.com	Wd.com	Synology.com
Overall rating	★★★★☆	★★★★☆	★★★★½	★★★★☆	★★★★☆
Drive bays	4	1	2	2	4
Processor	2GHz Marvell single-core	800MHz Marvell Armada 370	1.6GHz Marvell single-core	1.3 GHz Marvel Armada 385	1.2GHz Mindspeed Concerto
Memory	1GB DDR3	256MB DDR3	512MB DDR3	1GB DDR3	512MB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	2x	×	×	×	1x
USB port	2x USB 3.0, 2x USB 2.0	2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0	1x USB 3.0, 1x USB 2.0
Raid options	0/1/5/6/10/JBOD	None	0/1/JBOD	00/1/JBOD	0/1/5/6/10/JBOD
Software	Backup Station	DSM 5.1	HD Station	My Cloud	DSM 5.0
Dimensions	177x180x235mm	71x161x224mm	302x220x41mm	216x109x148mm	184x168x230mm
Weight	3kg	700g	1.5kg	3.5kg	2.2kg
Warranty	2 years	1 year	2 years	3 years	3 years
FULL REVIEW	TINYURL.COM/MCYWUB8	TINYURL.COM/MNEYVNK	TINYURL.COM/OEXRYNY	TINYURL.COM/M643BSG	TINYURL.COM/M643BSG

Best external hard drives

	1	2	3	4	5
		 PC ADVISOR RECOMMENDED	 PC ADVISOR RECOMMENDED		
	Seagate Backup Plus Slim	**Transcend StoreJet 25M3**	**WD My Passport Ultra Metal**	**Toshiba Canvio Basics**	**Seagate Seven mm**
Price	**£74 inc VAT**	**£70 inc VAT**	**£90 inc VAT**	**£76 inc VAT**	**£99 inc VAT**
Website	Seagate.com/gb/en	Uk.transcend-info.com	Wdc.com/en	Toshiba.co.uk	Seagate.com/gb/en
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Capacity tested	2TB	2TB	2TB	2TB	500GB
Capacity range	500GB, 1TB, 2TB	500GB, 1TB, 2TB	1TB, 2TB	500GB, 1TB, 2TB	500GB
Disk size	2.5in	2.5in	2.5in	2.5in	2.5in
Spin speed	N/A	5400rpm	N/A	5400rpm	5400rpm
Transfer speed	142MB/s	135MB/s	114MB/s	117MB/s	49MB/s
Encryption	N/A	256-bit AES	256-bit AES	256-bit AES	N/A
Other interfaces	USB 3.0	USB 3.0	USB 3.0	USB 3.0	USB 3.0
Software	Seagate Dashboard	Transcend Elite	WD Drive Utilities	None	Seagate Dashboard
Dimensions	113.5x76x12.1mm	130x82x19mm	110x80x19mm	111x79x21mm	123x82x7mm
Weight	159g	234g	241g	207g	178g
Warranty	2 years	3 years	3 years	2 years	2 years
FULL REVIEW	TINYURL.COM/OABWL4B	TINYURL.COM/M72D3EP	TINYURL.COM/L2B7V3B	TINYURL.COM/JWHHACB	TINYURL.COM/O6KZFDM

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Best SSDs



	1 OCZ Arc 100	2 Samsung 850 Pro	3 SanDisk Extreme Pro	4 Crucial MX200	5 Kingston HyperX Savage
Price	**£69 inc VAT**	**£365 inc VAT**	**£172 inc VAT**	**£301 inc VAT**	**£185 inc VAT**
Website	Ocz.com	Samsung.com/uk	Sandisk.co.uk	Uk.crucial.com	Kingston.com/en
Overall rating	★★★★½	★★★★½	★★★★½	★★★½☆	★★★½☆
Capacity tested	240GB	1TB	480GB	1TB	480GB
Price per GB	28.8p	36.5p	35.8p	30.1p	38.5p
Memory cache	512MB DDR3	1GB LPDDR2	1GB	1GB DDR3	256MB
Controller	Indilinx Barefoot 3 M10	Samsung MCX	Marvell 88SS9187	Marvell 88SS9189	Phison PS3110 S10
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	Unknown
Flash	Toshiba 19nm MLC	Samsung 40nm V-AND MLC	SanDisk 19nm MLC	Micron 16nm MLC	Toshiba 19nm A19 MLC
Firmware updated via	OCZ SSD Guru	Samsung SSD Magician	SandDisk SSD Dashboard	Crucial Storage Executive	None
ATTO peak sequential	489-/447MB/s	564-/534MB/s	556-/525MB/s	533-/514MB/s	564-/543MB/s
CDM peak IOPS	79.2-/90.3MB/s	103.2-/93.7MB/s	102.7/91.4MB/s	26.1/90.1MB/s	91.6-/94.8MB/s
CDM 4kB rnd	27-/127MB/s	36-/89MB/s	32-/88MB/s	29-/131MB/s	26-59MB/s
Warranty	3 years	10 years	10 years	3 years	3 years
FULL REVIEW	TINYURL.COM/QZQLYY4	TINYURL.COM/OVHDALD	TINYURL.COM/NMSJU25	TINYURL.COM/P3YX2KE	TINYURL.COM/ON54VUC

Smart thermostats



	1 Honeywell EvoHome	2 Heat Genius	3 Nest Learning Thermostat	4 Hive Active Heating	5 Tado
Price (from)	**£249 inc VAT**	**£7999 inc VAT**	**£179 inc VAT**	**£179 inc VAT**	**£199 inc VAT**
Website	Honeywelluk.com	Heatgenius.co.uk	Nest.com	Hivehome.com	Tado.com/gb
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Zones controlled	12	6	1	1	1
Hot water control	✓	✓	×	✓	✓
Underfloor heating	✓	×	×	×	×
Warranty	18 months	2 years	2 years	1 year	1 year
Verdict	EvoHome is the best smart heating system we've tested. It isn't perfect though, and it's also very expensive, or can be. But if you value convenience and comfort above saving money, it's the one to buy.	Heat Genius is very good at a very useful thing. It is easy to use and efficient. How long it takes to pay for itself will depend on your circumstances, and it may be that dropping £799 is too much of a long-term investment for you. If you are looking to install in your a zoned smart heating system, we are happy to recommend Heat Genius.	If you need only a single thermostat and don't need control over hot water, the Nest is a good choice. The Nest Protect smoke and carbon monoxide alarm also works with the thermostat, but it's not cheap. There's also the Nest Cam, but the tie-in with the thermostat is minimal.	The Hive Active Heating system is a great upgrade for anyone that wants or needs the ability to be able to control their heating remotely. It's by no means the most advanced smart thermostat, but it will do the job at a good price for a lot of people.	Tado is the best smart thermostat if you like the idea of presence detection as it simply follows you and your smartphone via GPS, and turns the heating up or down as you get further away or nearer home. There's also hot water control, but the thermostat itself isn't the best looking.
FULL REVIEW	TINYURL.COM/Q3CXA4Z	TINYURL.COM/Q2TUKL9	TINYURL.COM/N9MWV4G	TINYURL.COM/PDLCSAS	TINYURL.COM/O4K3A2A

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Best budget graphics cards

	1	2	3	4	5
					
	Sapphire Radeon R7 250X	**MSI R7 260X OC**	**EVGA GeForce GTX 750**	**Asus GeForce GT 740 OC**	**MSI GeForce GT 730**
Price	**£65 inc VAT**	**£91 inc VAT**	**£90 inc VAT**	**£65 inc VAT**	**£48 inc VAT**
Website	Sapphiretech.com	Uk.msi.com	Eu.evga.com	Asus.com/uk	Uk.msi.com
Overall rating	★★★★½	★★★½☆	★★★½☆	★★★½☆	★★★½☆
Graphics processor	AMD Radeon R7 250X	AMD Radeon R7 260X	nVidia GeForce GTX 750	nVidia GeForce GT 740	nVidia GeForce GT730
Installed RAM	1GB GDDR5	2GB GDDR5	1GB GDDR5	1GB GDDR5	2GB GDDR3
Memory interface	128-bit	128-bit	128-bit	128-bit	128-bit
Core clock	950MHz	1175MHz	1294MHz	1033MHz	780MHz
Memory clock/Effective	1125/4500MHz	1625MHz/6.5GHz	1253/5012MHz	1.25/5GHz	900/1800MHzHz
Stream processors	640	896	512	384	320
Texture units	40	56	32	32	20
Power connectors	1x 6-pin	1x 6-pin	None	1x 6-pin	1x 6-pin
DirectX	12	11.1	Unknown	Unknown	Unknown
Digital interface	1x DVI, HDMI, DisplayPort	2x DVI, HDMI, Mini-DP	1x DVI, HDMI, DisplayPort	1x DVI, HDMI, VGA	1x DVI, HDMI, VGA
Warranty	2 years	3 years	3 years	3 years	2 years
FULL REVIEW	TINYURL.COM/OLJ83SQ	TINYURL.COM/OZ6WUYT	TINYURL.COM/PB3F6EN	TINYURL.COM/PAH5VMJ	TINYURL.COM/P8J4C2R

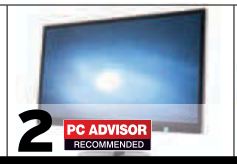
Best graphics cards

	1	2	3	4	5
					
	Asus GeForce GTX 980 Ti	**Zotac GeForce GTX 980 Ti**	**MSI GTX 980 Gaming 4G**	**Club3D Radeon R9 390**	**XFX Radeon R9 390X**
Price	**£639 inc VAT**	**£532 inc VAT**	**£404 inc VAT**	**£288 inc VAT**	**£309 inc VAT**
Website	Asus.com/uk	Zotac.com	Uk.msi.com	Club-3d.com	Xfxfore.com/en-gb
Overall rating	★★★★★	★★★★½	★★★★½	★★★★½	★★★★☆
Graphics processor	nVidia GeForce GTX 980 Ti	nVidia GeForce GTX 980 Ti	nVidia GeForce GTX 980	AMD Radeon R9 390	AMD Radeon R9 390X
Installed RAM	12GB	12GB	4GB	8GB	8GB
Memory interface	384-bit	512-bit	256-bit	512-bit	512-bit
Core clock/boost	1216/1317MHz	1105/1140MHz	1216/1317MHz	1010MHz	1050MHz
Memory clock	7200MHz	7010MHz	7010MHz	6000MHz	6000MHz
Stream processors	2816	2816	2048	2560	2816
Texture units	172	172	128	160	176
Power connectors	2x 8-pin	1x 8-pin, 1x 6-pin	2x 8-pin	1x 8-pin, 1x 6-pin	1x 8-pin, x 6-pin
DirectX	12	12	12	12	12
Digital interface	DVI, HDMI 2.0, 3x DisplayPort 1.2	DVI, HDMI, 3x Mini-DisplayPort	DVI, HDMI, 3x DisplayPort	2x DVI, HDMI, DisplayPort 1.2	2x DVI, HDMI, DisplayPort 1.2
Warranty	3 years	5 years	3 years	2 years	3 years
FULL REVIEW	TINYURL.COM/NDZZQKJ	TINYURL.COM/POYHNUH	TINYURL.COM/Q5OPK9S	TINYURL.COM/PC5PGWM	TINYURL.COM/Q8Q2GVS

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Best budget flat-panel displays









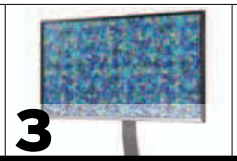


	AOC i2369Vm	Philips 234E5QHAW	NEC MultiSync E243WMi	BenQ EW2740L	BenQ GL2450
Price	**£130 inc VAT**	**£130 inc VAT**	**£194 inc VAT**	**£175 inc VAT**	**£108 inc VAT**
Website	Aoc-europe.com/en	Philips.co.uk	Nec-display-solutions.com	Benq.co.uk	Benq.co.uk
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Screen size	23in	23in	23.8in	27in	24in
Panel type	IPS matt	IPS matt	IPS matt	VA semi-matt	TN matt
Native resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Pixel density	96ppi	96ppi	93ppi	82ppi	92ppi
Brightness	220cd/m²	187cd/m²	250cd/m²	300cd/m²	261cd/m²
Static contrast ratio	630:1	210:1	650:1	280:1	610:1
Response time	6ms	5ms	6ms	4ms	5ms
Ports	HDMI, HDMI/MHL, DP, VGA	2x HDMI (QHAB) or 1x HDMI (QDAB), VGA	DP, DVI-D, VGA	2x HDMI, VGA	DVI-D, VGA
Dimensions	531x204x398mm	532x213x414mm	558x214x380-490mm	623x191x451mm	579x179x436mm
Weight	3.75kg	3.5kg	6.3kg	4.2kg	4.1kg
Warranty	3 years	2 years	3 years	2 years	2 years
FULL REVIEW	TINYURL.COM/OOEFYPR	TINYURL.COM/KLYLW4V	TINYURL.COM/KNCGVOU	TINYURL.COM/OO6EC5L	TINYURL.COM/OOUPFUE

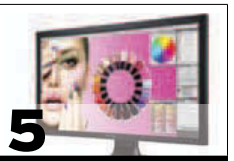
Best 4K flat-panel displays











	BenQ BL3201PT	Philips BDM4065UC	Samsung UD970	Acer S277HK	ViewSonic VP2780-4K
Price	**£699 inc VAT**	**£600 inc VAT**	**£1,400 inc VAT**	**£499 inc VAT**	**£699 inc VAT**
Website	Benq.co.uk	Philips.co.uk	Samsung.com/uk	Acer.co.uk	Viewsoniceurope.com/uk
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Screen size	32in	40in	31.5in	27in	27in
Panel type	IPS	VA	PLS	IPS	IPS
Native resolution	3840x2160	3840x2160	3840x2160	3840x2160	3840x2160
Pixel density	157ppi	110ppi	140ppi	163ppi	163ppi
Brightness	350cd/m²	120cd/m²	350cd/m²	300cd/m²	350cd/m²
Static contrast ratio	1000:1	5000:1	1000:1	530:1	1000:1
Response time	4ms	8.5ms	8ms	4ms	5ms
Ports	DVI-DL, HDMI, DP, mDP	HDMI, DP, mDP, VGA	HDMI, DVI, 4x USB 3.0	DVI, HDMI, DP, mDP, 4x USB 3.0	HDMI, DP, 4x USB 3.0
Dimensions	490.2x740.3x213.4mm	904x512x88mm	728x427x62mm	614x406x113mm	642.7x469.7x347.8mm
Weight	12.5kg	8.5kg	10.3kg	4.9kg	11.7kg
Warranty	3 years	2 years	Not specified	Not specified	3 years
FULL REVIEW	TINYURL.COM/NPA62QL	TINYURL.COM/Q2W3VZY	TINYURL.COM/OBWBBYN	TINYURL.COM/NTV4EVD	TINYURL.COM/069CMTB

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Best e-book readers

	1	2	3 PC ADVISOR RECOMMENDED	4	5
					
	Amazon Kindle Voyage	**Amazon Kindle (7th gen)**	**Amazon Kindle Paperwhite**	**Nook GlowLight**	**Kobo Aura H2O**
Price	**£169 inc VAT**	**£59 inc VAT**	**£109 inc VAT**	**£89 inc VAT**	**£139 inc VAT**
Website	Amazon.co.uk	Amazon.co.uk	Amazon.co.uk	Nook.com/gb	Kobo.com
Overall rating	★★★★☆	★★★½☆	★★★★☆	★★★★☆	★★★☆☆
Screen size	6in touchscreen	6in touchscreen	6in touchscreen	6in touchscreen	6.8in touchscreen
Screen technology	E Ink	E Ink	E Ink	E Ink	E Ink
Screen resolution	1440x1080	600x800	768x1024	758x1024	1430x1080
Built-in light	Yes	No	Yes	Yes	Yes
Storage	4GB	4GB	2GB	4GB	4GB, microSD up to 32GB
Book store	Amazon Kindle	Amazon Kindle	Amazon Kindle	Nook	Kobo
Cellular connectivity	Optional extra	No	Optional extra	No	No
Battery life	Six weeks	Four weeks	Eight weeks	Eight weeks	Two months
Dimensions	162x115x7.6mm	169x119x10.2mm	117x169x9.1mm	127x166x10.7mm	179x129x9.7mm
Weight	180g	191g	206g	175g	233g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NXAAU3Q	TINYURL.COM/NSFORJE	TINYURL.COM/PREZPRK	TINYURL.COM/OZ5WMPO	TINYURL.COM/MJVR4M9

Best media streamers

	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4	5
					
	Roku Streaming Stick	**Roku 3**	**Google Chromecast**	**Amazon Fire TV Stick**	**Apple TV**
Price	**£49 inc VAT**	**£99 inc VAT**	**£30 inc VAT**	**£35 inc VAT**	**£59 inc VAT**
Website	Roku.com	Roku.com	Play.google.com	Apple.com/uk	Apple.com/uk
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Type	Dongle	Set-top box	Dongle	Dongle	Set-top box
Ports	HDMI, Micro-USB	HDMI, USB, ethernet	HDMI, Micro-USB	HDMI, Micro-USB	HDMI, ethernet, Micro-USB
Processor	600MHz single-core	900MHzsingle-core	Single-core	Dual-core	Apple A5 single-core
RAM	512MB	512MB	512MB	1GB	512MB
Graphics	Not specified	Not specified	Not specified	Not specified	Not specified
Storage	None	512MB plus microSD slot	None	8GB (not user-accessible)	8GB (not user-accessible)
Voice search	No	Yes	No	No	No
Remote control	Yes	Yes	No	Yes	Yes
Dimensions	78.7x27.9x12.7mm	89x89x25mm	72x35x12mm	84.9x25x11.5mm	98x98x23mm
Weight	18g	170g	34g	25g	270g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OAP9QF9	TINYURL.COM/PT7MGUL	TINYURL.COM/QBGTCS2	TINYURL.COM/NAQRNOC	TINYURL.COM/OLCJRC3

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Best games consoles



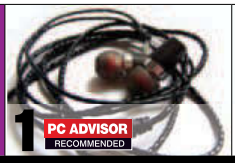
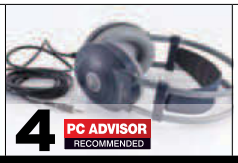
	1 Sony PlayStation 4	2 Microsoft Xbox One	3 Nintendo Wii U Premium	4 Sony PlayStation 3 Super Slim	5 Microsoft Xbox 360
Price	**£349 inc VAT**	**£349 inc VAT**	**£249 inc VAT**	**£249 inc VAT**	**£199 inc VAT**
Website	Playstation.com	Xbox.com	Nintendo.co.uk	Playstation .com	Xbox.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★½	★★★★★
Processor	Octa-core AMD x86	1.75GHz octa-core AMD x86	IBM Power multicore CPU	IBM CPU	IBM Xenon CPU
Graphics	1.84TFlops AMD Radeon GPU	1.31TFlops AMD Radeon GPU	AMD Radeon GPU	256MB nVidia RSX	512MB ATI Xenos
RAM	8GB GDDR5	8GB DDR3	Not specified	Not specified	512MB GDDR3
Storage	500GB	500GB	32GB, plus SD card support	500GB	500GB
Optical drive	Blu-ray, DVD, game discs	Blu-ray, DVD, game discs	Wii U, Wii discs only	Blu-ray, DVD, game discs	DVD, game discs
Ports	2x USB 3.0, AUX, HDMI	USB 3.0, HDMI	4x USB 2.0, HDMI	2x USB 2.0, HDMI	5x USB, HDMI
Connectivity	Ethernet, 802.11b/g/n, Bluetooth	Ethernet, 802.11b/g/n	802.11b/g/n	Ethernet, 802.11b/g/n, Bluetooth	Ethernet, 802.11b/g/n
Other	1 controller	1 controller, 4K, Kinect option	1 controller	1 controller	1 controller
Dimensions	275x53x305mm	333x274x79mm	46x269x171mm	290x230x60mm	269x75x264mm
Weight	2.8kg	3.2kg	1.6kg	2.1kg	2.9kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NBFLQK2	TINYURL.COM/M6J4KHS	TINYURL.COM/6J49LHL	TINYURL.COM/QDJP56O	TINYURL.COM/PFP9CCK

Best budget portable speakers



	1 Denon Envaya Mini	2 UE Roll	3 Lumsing B9	4 i-box Twist	5 Inateck MarsBox BP2002
Price	**£99 inc VAT**	**£99 inc VAT**	**£23 inc VAT**	**£41 inc VAT**	**£46 inc VAT**
Website	Denon.com	Ultimateears.com	Lumsing.com	Iboxstyle.com	Inateck.com
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Speaker(s)	Not specified	Not specified	Not specified	2x 3W	2x 5W
Bluetooth	Bluetooth 4.0	Bluetooth	Bluetooth 3.0 + EDR	Bluetooth 2.1	Bluetooth 4.0
Handsfree calls	Yes	No	Yes	Yes	Yes
NFC	Yes	Yes	Yes	No	No
Frequency response	Not specified	108Hz to 20kHz	20Hz to 20kHz	Not specified	76Hz to 108MHz
Impedence	Not specified	Not specified	4 ohms	Not specified	Not specified
Extra features	IPX4 splashproof	IPX7 splashproof	MicroSD slot, lanyard	None	None
Claimed battery life	10 hours	9 hours	25 hours	5 hours	10 to 15 hours
Dimensions	209x54x51mmmm	134x39x40mm	177x50x70mm	246x59x56mm	185.4x61.5x61.5mm
Weight	558g	330g	300g	380g	710g
Warranty	1 year	2 years	1 year	5 years	1 year
FULL REVIEW	TINYURL.COM/QDRNP3P	TINYURL.COM/O7T7ZUU	TINYURL.COM/P623MK8	TINYURL.COM/LET9RDF	TINYURL.COM/QBCJJG2

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Best budget headphones	 1 PC ADVISOR RECOMMENDED	 2 PC ADVISOR RECOMMENDED	 3 PC ADVISOR RECOMMENDED	 4 PC ADVISOR RECOMMENDED	 5
	Rock Jaw Alpha Genus	**RHA MA450i**	**Sennheiser HD 429**	**AKG K77**	**SoundPeats A1**
Price	**£41 inc VAT**	**£39 inc VAT**	**£45 inc VAT**	**£25 inc VAT**	**£25 inc VAT**
Website	Rockjawaudio.com	Rha-audio.com/uk	En-uk.sennheiser.com	Uk.akg.com	Amazon.co.uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Type	In-ear	In-ear	Circumaural over-ear	Circumaural over-ear	Circumaural over-ear
Frequency response	20Hz to 20kHz	16Hz to 22kHz	18Hz to 22kHz	18Hz to 20.5kHz	20Hz to 20kHz
Nominal impedence	16 ohms	16 ohms	32 ohms	32 ohms	Not specified
Sensitivity	108dB	103dB	110dB	112dB	Not specified
In-line remote	No	Yes (3 button)	No	No	No
Mic	No	Yes	No	No	Yes
Extra grommets	Yes, and filters	Yes	N/A	N/A	N/A
Carry case	Yes	Yes	No	No	No
Cable length	1.2m (twisted)	1.5m (braided)	3m	2.5m	Not specified
Weight	11g	14g	218g	190g	210g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NNYUFBF	TINYURL.COM/P7W7RVL	TINYURL.COM/ND8TD8O	TINYURL.COM/PA8FOX4	TINYURL.COM/NKFLHKL

Best headphones	 1 PC ADVISOR BEST BUY	 2	 3 PC ADVISOR RECOMMENDED	 4	 5
	Denon AH-D600	**Audio-Technica ATH-WS99**	**Bose QuietComfort 20**	**Denon AH-W150**	**Bowers & Wilkins P5**
Price	**£229 inc VAT**	**£79 inc VAT**	**£259 inc VAT**	**£59 inc VAT**	**£249 inc VAT**
Website	Denon.co.uk	Eu.audio-technica.com/en	Bose.co.uk	Denon.co.uk	Bowers-wilkins.co.uk
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★½
Type	Circumaural over-ear	Over-ear	In-ear	Over-ear wireless buds	On-ear, foldable
Frequency response	8Hz to 25kHz	8Hz to 25kHz	20-21kHz	5Hz to 25kHz	10Hz to 20kHz
Nominal impedence	37 ohms	37 ohms	32 ohms	16 ohms	22 ohms
Sensitivity	120dB	120dB	105dB	102dB	108dB
In-line remote	Yes	Yes	Yes	Yes	No
Mic	No	Yes	Yes	Yes	Yes
Extra grommets	N/A	N/A	Yes	Yes	N/A
Carry case	Yes	No	Yes	Yes	No
Cable length	3m	0.8m	1.3m	N/A	1.2m
Weight	250g	250g	44g	23g	195g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NBCFJW6	TINYURL.COM/QDRCCAT	TINYURL.COM/OEAGFOF	TINYURL.COM/O2CJV3R	TINYURL.COM/NNRV6UT

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Best power banks











	Zendure A2 (2nd gen)	Xiaomi 10,000mAh	Maximas XTRON USB-C	iHarbot Power Bank MS024	Anker Astro Mini
Price	**£25 inc VAT**	**£11 inc VAT**	**$69 (£45)**	**£7.50 inc VAT**	**£13 inc VAT**
Website	Zendure.com	Mi.com/en	Indiegogo.com	Amazon.co.uk	Ianker.com
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Capacity	6700mAh	10,000mAh	13,400mAh	5000mAh	3200mAh
Input	1x 7.5W Micro-USB	1x 10W Micro-USB	1x 10W Micro-USB	1x 10.5W Micro-USB	1x 4W Micro-USB
Outputs	1x 10.5W USB	1x 10.5W USB	1x 21W USB	1x 10W USB	1x 5W USB
Auto-on/-off	Yes	Yes	No	Auto-on	No
Passthrough charging	Yes	Yes	No	Yes	No
Status indicator	4 LEDs	4 LEDs	4 LEDs	4 LEDs	No
LED flashlight	No	No	No	No	No
Carry case	Yes	No	No	No	Yes
Dimensions	93x48x23mm	91x60.4x22mm	77x21x93mm	118x11.6x63mm	92x23x23mm
Weight	137g	207g	247g	150g	80g
Warranty	1 year	1 year	Not specified	18 months	18 months
FULL REVIEW	TINYURL.COM/NGCNO5F	TINYURL.COM/NFQZOCB	TINYURL.COM/PVO2LEC	TINYURL.COM/PVO2LEC	TINYURL.COM/PZHUHJO

Best desktop chargers











		CHOEtech 6-port Charger	iClever USB Travel Charger	Zendure Turbo Charger	Olixar Smart IC Charger	Inateck USB Charger
Price		**£25 inc VAT**	**£20 inc VAT**	**£25 inc VAT**	**£34 inc VAT**	**£15 inc VAT**
Website		Choetech.com	Hisgadget.com	Zendure.com	Mobilefun.co.uk	Inateck.com
Overall rating		★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Max output		60W	50W	40W	50W	35W
Outputs:	USB 1	15W USB	12W USB	12W USB	12.5W USB	10.5W USB
	USB 2	15W USB	12W USB	12W USB	12.5W USB	10.5W USB
	USB 3	15W USB	12W USB	12W USB	12.5W USB	5W USB
	USB 4	15W USB	12W USB	12W USB	12.5W USB	5W USB
	USB 5	12W USB	12W USB	12W USB	12.5W USB	5W USB
	USB 6	15W USB	12W USB	N/A	12.5W USB	N/A
Colours available		Black	Black	Black, white	White	Black
Dimensions		71.5x29x88.4mm	100x69x27mm	97x60x27mm	100x69x26mm	100x55x20mm
Weight		158g	180g	166g	189g	340g
Warranty		1 year	1 year	1 year	2 years	1 year
FULL REVIEW		TINYURL.COM/QG4X5D9	TINYURL.COM/MPA4DWC	TINYURL.COM/NKYNJ7P	TINYURL.COM/OCZXK93	TINYURL.COM/KBXUHDF

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BILL SNYDER



Differing priorities

Want a free TV? Buy a Windows 10 PC from Dell. Like other computer vendors, Dell is waging a desperate struggle to stop customers from defecting to smartphones, phablets, and tablets. Indeed, Dell was so eager to ride the Windows 10 upgrade wave, it even offered customers free shipping and a guarantee that their new PCs would arrive on 29 July – launch day for the new operating system.

There's nothing wrong with old-fashioned salesmanship, but the arrival of the new Windows 10 has left many owners of older PCs out in the cold and has laid bare the differing priorities of Microsoft and the hard-pressed PC makers.

Microsoft doesn't care if you buy a new PC

Microsoft is doing everything it can to push Windows 10 on to as many PCs as possible. It's even forgoing significant amounts of revenue by offering Windows 10 as a free upgrade, a clever business move that has pleased enterprise IT.

PC makers, of course, are always much less interested in having their customers upgrade their existing systems than in selling new ones. That's not new, but with Windows 10, the contradiction between the needs of the vendors and Microsoft has never been sharper.

Microsoft damaged the PC makers by producing the deservedly unpopular Windows 8, and there was plenty of public grumbling by PC executives about it. Now Microsoft is telling people who have those unloved systems they don't need new ones. That will only perpetuate the PC makers' pain.

Something had to give, and in this case, it's the needs of the owners of older PCs.

The 'supported' list – and beyond

Whenever a new Windows operating system debuts, driver and BIOS issues emerge. It's tough on businesses, and on consumers, who may suddenly find that they can no longer print, connect to the network or use an expensive graphics card.

I've checked in with the major PC makers and found that some of them have web pages listing what they call 'supported systems' that will run Windows 10. Those pages are not so easy to find, but they exist at Lenovo, Dell, Acer and Toshiba. HP and Asus provide system lookup pages for checking out individual PCs.

What does 'supported' mean? In most cases, it means that the PC maker has updated drivers or has tested the system, including the BIOS, and has determined it can run Windows 10.

Less clear, though, is what to do if a PC is not on the list. In some cases, the system will run Windows 10, although the manufacturer has not written drivers or tested it. In other cases, it won't run the operating system at all.

Microsoft has provided its own tool to test for Windows 10 compatibility. The Get Windows 10 app was pushed on to many PCs before the operating systems's release during routine updates. If you fire up the app and select the 'Check Your PC' option, the app will scan your system for potential Windows 10 compatibility problems.

What happens if Microsoft says your PC is okay to upgrade, but that system isn't on the vendor's supported list? An Acer spokeswoman told me: "We will release any required BIOS updates and/or drivers for any systems on the approved list. If a product is not on the approved list, a customer may still be able to install Windows 10, but we will not release new BIOS/drivers for Windows 10, cannot guarantee it will work, etc."

That's pretty much what I heard from the other companies, too.

Welcome to patch city

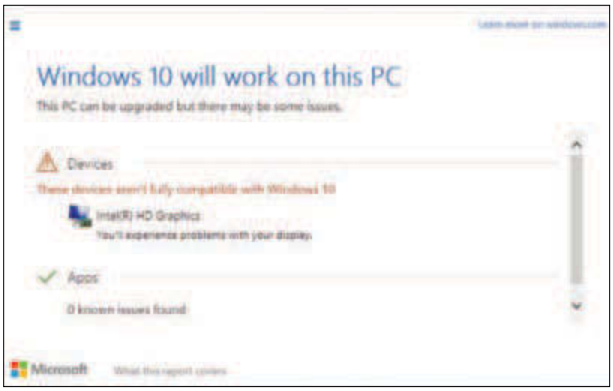
The worst case is when Microsoft's compatibility app gives the thumbs-up and the system won't run properly once the update has been performed. If the PC was on the vendor's Windows 10 approved list, that vendor should provide support. If not, the chances of getting vendor support are slim.

Meanwhile, Microsoft is already whipping out patches on an operating system that has only been live for a couple of weeks. Microsoft has released the second 'cumulative update' – meaning a major set of patches – for Windows 10 in only three days.

We're also seeing buggy updates, an issue that has bedevilled Microsoft's Windows patches for several years now. Windows 10 is already experiencing its own buggy updates.

Overall, the OS is a huge improvement over Windows 8, but the reluctance of PC makers to support many potentially viable systems smacks of planned obsolescence. That won't do much to build loyalty at a time when the PC makers should be showering the thinning ranks of their customers with love.

"The worst case is when Microsoft's compatibility app gives the thumbs-up and the system won't run properly once the update has been performed"



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